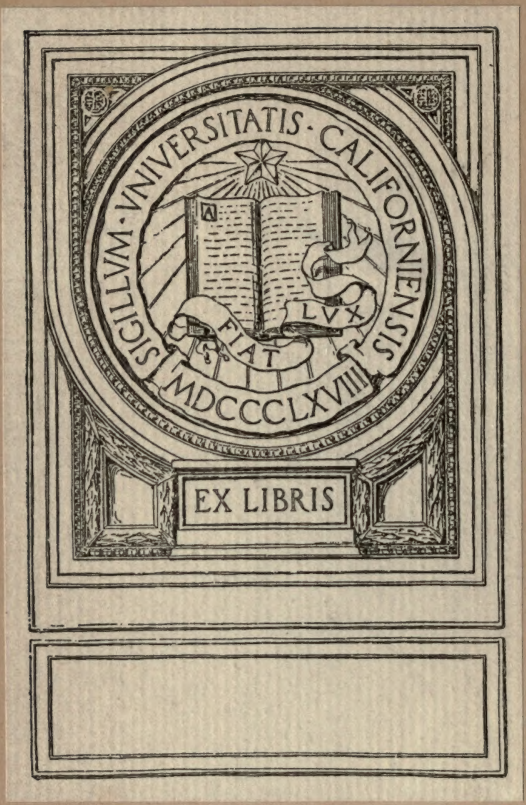
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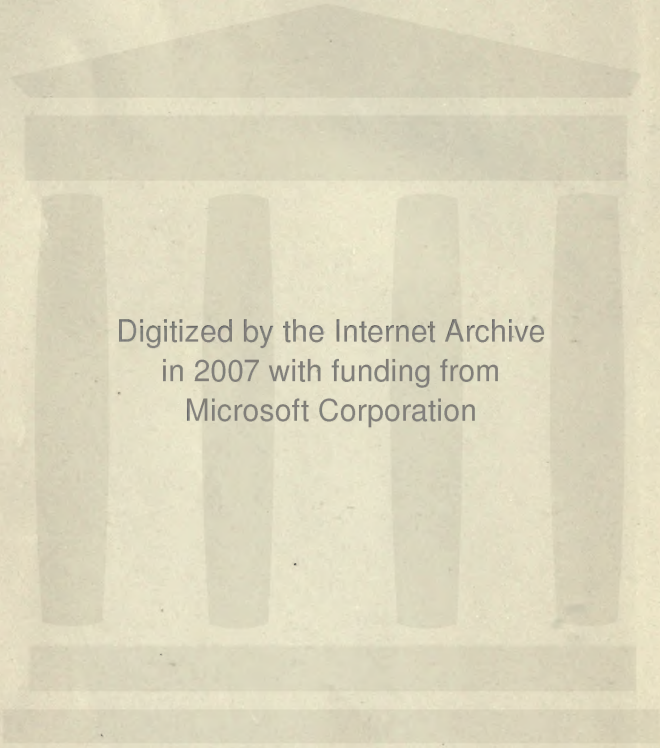

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The International Geography

Let things be—not seem,
I counsel rather,—do, and nowise dream!
EARTH'S YOUNG SIGNIFICANCE IS ALL TO LEARN:
The dead Greek lore lies buried in the urn
Where who seeks fire finds ashes.

Robert Browning.

The International Geography.

By Seventy Authors. With 489 Illustrations.

Edited by Hugh Robert Mill
D.Sc. (Edinburgh), LL.D. (St. Andrews), F.R.S.E.
Fellow or Honorary Corresponding Member of the Geographical Societies of London, Edinburgh, Paris, Berlin, Budapest, Amsterdam, Brisbane, and Philadelphia

NEW YORK
D. APPLETON AND COMPANY
1909

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KEANE, Dr. A. H.—The Distribution of Mankind.
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ZIMMERMANN, Maurice, Paris.—The French Colonies.

PREFACE

EARLY in 1897 I was requested by the publishers to prepare and edit a compact handbook of geography on a new plan, the suggestion being made that each section should be written by a specialist or recognised authority of high standing. Subject to the limitation of getting the whole world into one volume, I was given a free hand. As the value of the work depends so much on its composite authorship, it may be well to explain at the outset how the book was planned and carried out. Every page is new, each section being written expressly for this work and never previously published.

The allotment of space was made after comparing a number of the leading systematic text-books in all languages, and taking account of the area, the population and the degree of accurate knowledge regarding the different countries. The original allocation of space has, however, been slightly altered at the representation of the authors. As the book is intended to appear at first in the English language only, the parts of the world occupied or controlled by the English-speaking nations have been treated more fully than the rest; but without giving the excessive prominence to the native country which is characteristic of books intended only for school use.

The United Kingdom, though occupying much less space than in most English text-books, is treated in greater detail than any other large country. This is because the materials for its geographical description are perhaps more ample and as yet less studied than those of almost any other region. The United States could not be considered in equal detail, but the novel and scientific plan adopted for the chapter dealing with them makes it perhaps the most instructive in the book, and it is also the longest. The countries of Europe, especially those recognised as Great Powers, have also been treated more fully than is usual in English or American books, and from a point of view that cannot fail to throw new light on their nature and people. No part of the world dominated by Western civilisation is viewed as a foreign land; but is opened to study from within.

General rules as to style and method of treatment were drawn up as follows:—

RULES FOR CONTRIBUTORS.

1. Each author should write in the language most familiar to him. The contributions shall be translated under the superintendence of the Editor.

2. Every contribution must be written continuously, not in the form of tables or disconnected sentences. When statistics are given the tables should be placed at the end.

3. The Editor is solely responsible for the final *form* of the work, and in order to ensure uniformity he must be permitted to make any changes in literary style and arrangement of matter which he considers necessary; but authors are held responsible for facts and figures, which are to be approved by them in the final proof.

4. Subject to the possibility of minor alterations mentioned in No. 3, authors are given absolute freedom in their choice of facts and in the relative space devoted to the different divisions of the subject which they undertake.

5. In the description of a country the following order should be adopted:—

(i) The general configuration and geology of the country as a whole, including its river systems, its climate and natural resources, with a very brief outline of the fauna and flora.

(ii) The people as to race, language, history, and mode of government.

(iii) Manufactures, industries, and external trade, laying stress on the main staples of trade, and on the industries peculiar to the country. The system of internal communications.

(iv) Political divisions considered individually, with notices of towns. All towns with populations of 100,000 and upwards must be noticed; and all other towns which are of special importance. Care should be taken in every case where it is possible to indicate in a few words the characteristics of the site which determined the position of the town, or the geographical conditions which minister to its prosperity.

(v) A statistical table, giving the area and population at the last two censuses of the whole country, or in federal countries of the constituent States; the average values of exports and imports for three five-yearly periods, ten years apart, *e.g.* for 1871–75, 1881–85, 1891–95; the chief towns with their population at the two last censuses.

6. The introductory general discussions of mathematical, physical, commercial, political, etc., geography are to be written from a strictly *geographical* point of view, and in a purely *general* manner—*i.e.*, referring only to phenomena or conditions which are not restricted to particular regions. Only the most thoroughly established and vitally important facts should be stated. The object is not to give a treatise on the subject named, but to supply the few general facts and principles necessary to the comprehension of the special geography of individual countries.

7. The general description of a continent must refer only to the largest and most determinative features, and these should be taken in the following order: Coasts, Surface, Geology, Climate, Flora, Fauna, Anthropology, History, including territorial changes of the largest order.

A list of the most eminent geographical authorities was next drawn up, as a rule three names being selected for each subject; and in October, 1897, seventy-nine letters of invitation to contributors were posted, the latest date for receiving the MS. being fixed as July, 1898. Forty-seven of the authors first invited at once agreed to contribute. When a refusal was received a second author was applied to, and nineteen of these accepted. In ten cases a third author had to be applied to, and on three occasions four refusals were received before an affirmative answer. Altogether in order to secure the co-operation of the seventy authors whose work appears, letters, and sometimes many letters, had to be exchanged with 122 persons in all parts of the World from Norway to New Zealand.

Each section bears the author's name. Those which I compiled merely from literary knowledge are noted as "By the Editor," and in them I have to acknowledge the help of Miss E. J. HASTINGS; those under my

name relatè to subjects which I have specially studied. The first piece of MS. was received on December 13, 1897; the last not until March 11, 1899. The MS. of fifty-three authors (to seven of whom English is a foreign language) was written in English, that of eight in German, of five in French, and one each in Dutch, Danish, Spanish, and Portuguese.

The foreign contributions were translated, and the whole MS. for the book carefully revised in order to secure as much uniformity of terminology and spelling as possible. Proofs were then sent out to the authors and their corrections given effect to before the final revision in pages. In many cases page-proofs were also submitted to the author.

The most serious editorial difficulty encountered was in the spelling of place-names. An effort has been made to secure a consistent system, but it has only partially succeeded. The transliteration of Russian names was adopted after much consideration; the chief inconsistency it retains is the use of *y* as a consonant before *e* and *a*, and as a vowel before *i*. The spelling of native names in languages without a recognised alphabet has been brought into harmony with the Royal Geographical Society's rules in all cases where the pronunciation is known. Indian names are given throughout the work, almost without exception, in the form preferred by the author of the chapter on India. As an example of the perplexities of spelling, it may be noted that different authors used the words—Mahometan, Mahomedan, Mohammedan, Muhammedan, Musselman, Musalman, Moslem, and Muslim, for the people following the faith of Islam, and sheer despair of deciding as to the best form led to the nearly uniform use of what is certainly the worst—Mohammedan. It is inevitable that some inconsistencies remain uncorrected.

The arrangement of the subject matter in Part I. follows the natural order of the science. In Part II. the order is that of a natural sequence commencing with Europe on account of its historic claims, and taking the countries in geographical order from west and north to east and south. The Russian Empire having to be treated as a whole makes it necessary to anticipate part of the general description of the continent of Asia, which naturally follows, and leads on to Australasia. The Pacific Islands form a natural link with the American continents, and the circuit of the world is completed in Africa, and concluded by the Polar regions.

The index has been prepared with the intention that it should include the name of every place about which any information is given in the text, every geographical term which has a technical meaning, references to the chief resources of countries, and the names of all authors and of the leading geographers cited in the text. But it has been controlled by the omission of casual references, which would occupy space and not repay the trouble of turning up. It is mainly compiled by Mrs. H. R. MILL, whose constant collaboration in all the work of translation and editing has materially shortened the time of preparation of the book.

The illustrations are limited to sketch-maps and diagrams. Views are

excluded from considerations of space alone; it is fully recognised that well-selected pictures are of great value in all geographical descriptions. The numerous sketch-maps are intended to bring into prominence special features not usually shown in atlases, or apt to be lost in the abounding detail of ordinary maps. They must be looked upon as of value only for the limited purpose for which they are put forward. All the maps have been specially drawn (with the exception of the plans of towns supplied by Messrs. J. Bartholomew & Co., which will be recognised by their fulness of detail); they are either original or adapted from official maps or from those published in geographical journals or other scientific works. I have particularly to thank my friend Mr. E. HEAWOOD for the excellent maps he has prepared, and I am also indebted to Mr. B. B. DICKINSON and Mr. A. W. ANDREWS for the drawing of Fig. 242, and to Dr. A. J. HERBERTSON for the map of the rainfall of Europe (Fig. 53). Mr. SKEAPING, of George Newnes, Ltd., Mr. ADDISON, and Mr. J. BATCHELOR have also supplied a number of the drawings, and Messrs. Philip & Son those illustrating Chap. III. After the density of population diagrams had been prepared it was pointed out to me that the idea of representing this condition by the number of points on a square inch had already suggested itself to Mr. Holt Schooling, and been used by him in the *Strand Magazine*, vol. ix.—Jan. to June, 1895. The flags of the nations are introduced on account of the importance attaching to the flag in all countries as the mark of political unity and national individuality; the colonial badges because of the apt manner in which they often give expression to the natural conditions of the region. These have all been drawn by Mr. SKEAPING. The climate curves showing the mean temperature and rainfall for each month in a number of places, have been compiled from the original data by Dr. A. J. HERBERTSON and Mr. P. C. WAITE, Edinburgh.

The statistics following each section were, as a rule, sent by the author; but in a few cases they have been supplied or supplemented from the "Statesman's Year Book." Statistics are given mainly to serve as an index to the growth of countries by the comparison of figures for different dates. It must be remembered that, except for Europe, North America, and the colonies, most of the figures available are only approximate estimates, or sometimes nothing more than expert guesses; and they may be given variously in different sections. In no case are the odd units, tens, or hundreds in population of any importance, and, as a rule, the three first figures of any quantity are all that are of real value for purposes of comparison. The values for countries using a gold standard are expressed throughout in pounds sterling in the English edition and in dollars in the American edition, conversions being made on the basis of £1 = $5.

The lists of Standard Books are intended to give the titles of the best books dealing exclusively with the special subject or region under consideration. A selection of good general books on Geography is given at the end of this preface. Really "standard" books are not very numerous,

and some which are cited occupy their place only in default of better. Care has been taken to exclude the titles of any works known to contain untrustworthy statements; on the other hand, many excellent books, perhaps more worthy to appear than some which have been given, are omitted inadvertently or through ignorance.

I have to acknowledge gratefully the assistance rendered in reading the proofs by Professor W. M. DAVIS and Dr. J. W. GREGORY for the chapter on "Land-Forms," by Dr. J. E. MARR and Dr. J. SCOTT KELTIE for the "United Kingdom," by Dr. G. M. DAWSON, C.M.G., for "British North America," by Dr. FRANCISCO P. MORENO for the "Argentine Republic," and by the Agents-General of several colonies for revising the sections on which they are authorities.

Special thanks are due to Mr. FRANK MUNDELL for his vigilance and care in reading the whole of the proofs, and in facilitating the task of seeing the first edition through the press in 1899.

The results of the various Census Reports for 1900 and 1901 have been incorporated in the later editions, and the chapters have been thoroughly revised by the editor as well as by the authors or by competent specialists, thanks being due in particular to Mr. E. HEAWOOD and Dr. A. J. HERBERTSON for much help. The illustrations have been revised and many of them re-drawn, and the lists of standard books improved.

H. R. M.

62, Camden Square, London, N.W.
July, 1907.

STANDARD GEOGRAPHICAL BOOKS OF REFERENCE

E. Reclus—"Nouvelle Géographie Universelle," 19 vols. Paris, 1876–94. Also a translation, London.

A. Kirchhoff (editor)—"Unser Wissen von der Erde." Vienna, 1876—in progress.

"Stanford's Compendium of Geography and Travel." New Issue. London, 1899–1903.

Vivien de St. Martin and M. Rousselet—"Nouveau Dictionnaire de Géographie Universelle." 6 vols. Paris, 1879–95. Also supplement 1898–1900.

G. G. Chisholm—"The *Times* Gazetteer." London, 1895, (reprint) 1899.

"Encyclopædia Britannica" (Geographical Articles in Supplementary Volumes), 1902.

"Chambers's Encyclopædia" (Geographical Articles). 10 vols. Edinburgh. Latest edition.

J. S. Keltie and I. Renwick—"The Statesman's Year Book." London—Annual.

H. Wagner—"Geographisches Jahrbuch." Gotha—Annual [for trustworthy summaries of geographical progress].

O. Baschin—"Bibliotheca Geographica, herausgegeben von der Gesellschaft für Erdkunde zu Berlin." Berlin—Annual. [Gives a nearly complete list of the geographical publications of the year.]

L. Raveneau—"Bibliographie Géographique Annuelle. Annales de Géographie." Paris—Annual. [An annotated list of the best geographical publications of the year.]

"The Geographical Journal." Published monthly by the Royal Geographical Society, London. [Original records of the most recent travel, and the fullest monthly geographical bibliography and list of maps.]

"The Scottish Geographical Magazine." Published monthly by the Royal Scottish Geographical Society, Edinburgh.

"The Geographical Teacher," London. [The publication of the Geographical Association.]

"The National Geographic Magazine." Published monthly by the National Geographic Society, Washington.

"Journal of the American Geographical Society of New York."

"Journal of Geography." New York. [For teachers.]

"Petermanns Mitteilungen." Gotha—Monthly. [The Standard German geographical journal, remarkable for its excellent maps.]

"Ergänzungshefte zu Petermanns Mitteilungen." Gotha—published occasionally. [These separate numbers contain important geographical memoirs or records of travel.]

"Annales de Géographie." Paris—six numbers annually.

H. Haack—"Geographen-Kalender." Gotha—Annual [Handy summaries of geographical progress, names and addresses of the geographers, and geographical publications of all countries].

"Lippincott's New Gazetteer." London, 1906.

REFERENCE ATLASES.

"Stielers Hand-Atlas." Gotha, 1902–1903. [This finely engraved atlas is also issued in separate sheets. The plates are always kept up to date of publication and very few copies are printed at a time.]

W. and A. K. Johnston—"The Royal Atlas." Edinburgh. [The finest British atlas, but expensive.]

J. G. Bartholomew—"The Twentieth Century Citizen's Atlas." London, 1902. [The cheapest high-class atlas.]

F. Schrader—"Atlas de Géographie Moderne." Paris, 1890.

O. Spamer—"Grosser Hand-Atlas." Leipzig, 1897. [This is based on Schrader's Atlas with additional maps. Both are characterised by the number of their small maps, town plans, etc.]

H. Habenicht—"Taschen Atlas." Gotha. [The most perfect pocket atlas. A new edition is published almost every year.]

"L'Année Cartographique." Paris—Annual. [Maps showing all changes due to the explorations and treaties of the year.]

Vidal Lablache—"Atlas Général." Paris, 1894.

Index Chart to The International Geography.

(THE FIGURES INDICATE THE PAGES)

General Articles on Continents shown in this type 123, Articles on Countries thus 123, References to minor divisions i

CONTENTS

		PAGES
List of Authors		v
Preface		vii
Books of Reference		xii
Contents		xv

PART I.

PRINCIPLES OF GEOGRAPHY.

CHAP.		
I.	Geography; Principles and Progress. By Dr. H. R. Mill	1–13
II.	Mathematical Geography. By Dr. A. M. W. Downing, F.R.S.	14–25
III.	Maps and Map Reading. By E. G. Ravenstein	26–35
IV.	The Plan of the Earth. By Prof. J. W. Gregory, F.R.S.	36–45
V.	Land-Forms; their Nature and Origin. By Dr. H. R. Mill	46–59
VI.	The Oceans. By Sir John Murray, F.R.S., and Dr. H. R. Mill	60–71
VII.	The Atmosphere and Climate. By Dr. H. N. Dickson	72–82
VIII.	The Distribution of Living Creatures. By Prof. J. Arthur Thomson	82–95
IX.	The Distribution of Mankind. By Dr. A. H. Keane	96–108
X.	Political and Applied Geography. By Dr. J. Scott Keltie	109–121
	Heraldic Colour-Scheme for Flags	122

PART II.

CONTINENTS AND COUNTRIES.

BOOK I.—EUROPE.

XI.	The Continent of Europe. By G. G. Chisholm	123–137
XII.	The United Kingdom in General. By Dr. H. R. Mill	138–152
	Scotland	152–161

		PAGES
	England and Wales	161–187
	Ireland. By Prof. Grenville A. J. Cole	187–196
XIII.	THE SCANDINAVIAN KINGDOMS:—	
	Sweden and Norway. By Prof. Yngvar Nielsen	197–208
	Denmark. By the Editor	208–211
	Iceland. By Dr. Th. Thoroddsen	212–215
XIV.	THE LOW COUNTRIES:—	
	The Netherlands. By Prof. C. M. Kan	216–223
	Belgium. By Prof. J. du Fief	223–230
	Luxemburg. By the Editor	231–232
XV.	THE FRENCH REPUBLIC:—	
	Physical Geography. By Prof. A. de Lapparent	233–239
	General Geography. By Prof. L. Raveneau	239–255
XVI.	SWITZERLAND. By Prof. Émile Chaix	256–265
XVII.	THE GERMAN EMPIRE. By Prof. A. Kirchhoff	266–297
XVIII.	THE AUSTRO-HUNGARIAN MONARCHY:—	
	Austria-Hungary. By Prof. A. Penck	298–301
	Austria. By Prof. A. Penck	302–315
	Hungary. By Dr. Béla Erödi	315–323
	Bosnia-Herzegovina. By Prof. A. Penck	324–326
XIX.	THE DANUBIAN AND BALKAN STATES. By Prof. A. Philippson:—	
	Rumania	327–330
	The Balkan Peninsula	330–335
	Servia	335–337
	Montenegro	337
	Bulgaria	338–339
	European Turkey	340–344
	Greece	344–349
	Crete	350–351
XX.	ITALY AND MALTA:—	
	Italy. By Prof. T. Fischer	352–365
	San Marino. By the Editor	365–366
	Malta. By Sir R. Lambert Playfair	366–367
XXI.	THE IBERIAN PENINSULA:—	
	Spain. By Prof. T. Fischer	368–377
	Andorra. By the Editor	377–378
	Gibraltar. By Sir R. Lambert Playfair	378–379
	Portugal. By Capt. E. de Vasconcellos	379–385
XXII.	THE RUSSIAN EMPIRE. By D. Aïtoff:—	
	General	386–389
	Configuration	389–401
	Climate and Anthropogeography	401–409
	Towns	409–421

BOOK II.—ASIA.

		PAGES
XXIII.	THE CONTINENT OF ASIA. By Dr. A. J. Herbertson	422–438
XXIV.	ASIATIC TURKEY AND ARABIA. By Sir C. W. Wilson, F.R.S. :—	
	Anatolia	439–445
	Cyprus. By Sir R. Lambert Playfair	445–446
	Mesopotamia	447–448
	Syria	448–451
	Arabia	451–456
XXV.	THE COUNTRIES OF IRAN :—	
	Persia. By Sir F. Goldsmid	457–463
	Afghanistan. By Sir G. S. Robertson, M. P.	464–468
XXVI.	INDIA AND CEYLON :—	
	The Empire of India. By Sir Athelstan Baines	469–502
	Portuguese India. By Capt. E. de Vasconcellos	502–503
	French Possessions in India. By M. Zimmermann	503
	Himalayan States. By the editor	503
	Ceylon. By Hon. J. Ferguson	503–507
XXVII.	INDO-CHINA :—	
	Siam. By H. Warington Smyth	508–511
	Straits Settlements and the Malay States. By the Editor	511–515
	French Indo-China. By M. Zimmermann	515–520
XXVIII.	THE CHINESE EMPIRE. By G. G. Chisholm	521–536
	Hongkong. By the Editor	536–537
	Macao. By Capt. E. de Vasconcellos	538
	Kiau-chou. By Count Pfeil	538
	Remote Provinces of Chinese Empire	538–541
	Korea. By Mrs. Bishop	542–544
XXIX.	JAPAN. By W. B. Mason	545–554
XXX.	THE MALAY ARCHIPELAGO. By Dr. H. O. Forbes	555–574
	The Philippines	558–559
	British Borneo	559–560
	The Dutch East Indies	560–573
	Portuguese Timor. By Capt. E. de Vasconcellos	573

BOOK III.—AUSTRALASIA AND POLYNESIA.

XXXI.	THE CONTINENT OF AUSTRALIA. By C. H. Barton	575–586
XXXII.	EASTERN STATES OF THE COMMONWEALTH :—	
	Queensland. By C. H. Barton	587–593
	New South Wales. By E. A. Petherick	593–601
	Victoria. By E. A. Petherick	602–610
	Tasmania. By the Editor	610–613

PAGES

XXXIII. CENTRAL AND WESTERN STATES OF THE COMMONWEALTH :—
South Australia. By E. A. Petherick . . . 614–620
Western Australia. By Hon. D. W. Carnegie . 620–626
XXXIV. NEW ZEALAND. By Hon. W. P. Reeves . . 627–634
XXXV. MELANESIA :—
British New Guinea. By Sir William Macgregor . 635–638
German New Guinea. By Count Pfeil . . 639–641
Dutch New Guinea. By Prof. C. M. Kan . . 642–644
New Caledonia. By Prof. A. Bernard . . 644–646
Smaller Melanesian Islands. By the Editor . . 646–648
XXXVI. THE ISLANDS OF THE PACIFIC OCEAN. By the Editor 649–662
Fiji 651–653
Western Polynesian Chain 653–656
Marshall Islands. By Count Pfeil . . 654–655
South Polynesian Chain 656–658
Scattered Groups 658–660
Hawaii 660–662

BOOK IV.—NORTH AMERICA.

XXXVII. THE CONTINENT OF NORTH AMERICA. By Prof. W. M. Davis 664–678
XXXVIII. COLONIAL NORTH AMERICA :—
Dominion of Canada. By J. B. Tyrrell . . 679–704
Newfoundland and Labrador. By J. B. Tyrrell . 704–707
St. Pierre and Miquelon. By M. Zimmermann . 707–708
Bermuda. By the Editor 708–709
XXXIX. THE UNITED STATES. By Prof. W. M. Davis . 710–773
XL. MEXICO. By Prof. A. Heilprin 774–781

BOOK V.—CENTRAL AND SOUTH AMERICA.

XLI. CENTRAL AMERICA :—
The Central American Republics. By Dr. K. Sapper 782–789
British Honduras. By the Editor . . . 789–790
XLII. THE WEST INDIES :—
General Features. By J. Rodway . . . 791–793
Cuba. By R. T. Hill 793–798
Porto Rico. By R. T. Hill 798–801
Haïti and Santo Domingo. By J. Rodway . 801–802
West Indian Colonies. By J. Rodway . . 803–812
XLIII. THE CONTINENT OF SOUTH AMERICA. By Dr. A. J. Herbertson 813–823
XLIV. THE ANDEAN COUNTRIES :—
Colombia. By Prof. F. Regel . . . 824–829

		PAGES
	Ecuador. By Sir Clements R. Markham, F.R.S. .	829–833
	Peru. By Sir Clements R. Markham, F.R.S. .	834–840
	Bolivia. By Sir Clements R. Markham, F.R.S. .	840–843
	Chile. By Prof. A. Bertrand . . .	843–848
XLV.	THE PLATA COUNTRIES :—	
	The Argentine Republic. By H. D. Hoskold .	849–856
	Uruguay. By A. F. Baillie . . .	856–859
	Paraguay. By A. F. Baillie	859–862
	The Falkland Islands. By the Editor . .	863–864
XLVI.	BRAZIL. By J. Batalha-Reis	865–877
XLVII.	NORTHERN SOUTH AMERICA :—	
	The Colonies of Guiana. By J. Rodway .	878–883
	Venezuela. By Dr. W. Sievers . . .	884–888

BOOK VI.—AFRICA.

XLVIII.	THE CONTINENT OF AFRICA. By E. Heawood .	889–903
XLIX.	NORTH AFRICA :—	
	Marocco. By Sir R. Lambert Playfair . .	904–906
	Algeria. By Sir R. Lambert Playfair . .	906–913
	Tunisia. By Sir H. H. Johnston . . .	913–916
	Tripoli. By J. L. Myres	916–918
	Egypt. By Dr. W. F. Hume . . .	918–929
L.	EAST AFRICA :—	
	Eastern Equatorial Africa. By Prof. J. W. Gregory, F.R.S.	930–940
	Abyssinia	934–935
	Eritrea	935
	Obok. By M. Zimmermann . . .	935–936
	Somaliland	936
	British East Africa	937–940
	German East Africa. By Count Pfeil . .	940–944
	Portuguese East Africa. By Capt. E. de Vasconcellos	944–946
	British Central Africa. By Sir H. H. Johnston .	946–951
LI.	WEST AFRICA :—	
	Spanish West Africa. By E. Heawood .	952–953
	French West Africa. By M. Zimmermann .	953–959
	Liberia. By E. Heawood . . .	959–960
	British West African Colonies. By Sir H. H. Johnston	960–969
	Nigeria. By Lieut.-Col. Mockler-Ferryman .	969–972
	German West Africa. By Count Pfeil . .	972–974
	The Congo Free State. By Capt. S. L. Hinde .	974–979
	Portuguese West Africa. By Capt. E. de Vasconcellos	979–984

		PAGES
LII.	SOUTH AFRICA:—	
	Cape Colony. By Dr. T. Muir, F.R.S., and Dr. F. C. Kolbe	985–993
	Natal. By Right Hon. J. Bryce, F.R.S.	993–997
	Southern Rhodesia and Bechuanaland. By F. C. Selous	997–1003
	Orange River Colony. By Right Hon. J. Bryce, F.R.S.	1004–1006
	Transvaal Colony. By Right Hon. J. Bryce, F.R.S.	1007–1011
	German South-West Africa. By Count Pfeil	1012–1013
	Islands of South Atlantic. By E. Heawood	1013–1014
LIII.	ISLANDS OF THE WESTERN INDIAN OCEAN:—	
	Madagascar. By Rev. J. Sibree	1015–1020
	Mauritius and Dependencies. By the Editor	1020–1024
	Réunion. By M. Zimmermann	1024

BOOK VII.—THE POLAR REGIONS.

LIV.	THE ARCTIC RECORD. By Sir Martin Conway	1025–1033
	THE ARCTIC REGIONS. By Dr. F. Nansen	1033–1046
LV.	THE ANTARCTIC REGIONS. By Sir John Murray, F.R.S.	1047–1053
INDEX		1053–1088

The International Geography

PART I

PRINCIPLES OF GEOGRAPHY

CHAPTER I.—GEOGRAPHY: PRINCIPLES AND PROGRESS

By Hugh Robert Mill, D.Sc.

The Plan of the Book.—The object of this book is to present in one volume an authoritative summary of the whole of Geography as fully as space permits. The limit of size makes it impossible to treat any part of the subject exhaustively, but by sacrificing such details as may be found better expressed in the maps of an atlas it is possible to give prominence to the essential facts. Like most treatises on geography, this is divided into two unequal and contrasted parts. The first deals with the *Principles of Geography* and their applications in the most general sense. It is compressed into small compass, because the aim kept in view is rather to illustrate the principles by their application to actual cases than to produce a theoretical work. The second part accordingly deals more fully with the *Countries of the World* at the present day; each article involving the application of some or all of the general principles stated in the first part.

The book is neither a Gazetteer nor an Encyclopædia, but is intended to give a readable account of the character of all countries as regards land and people in language which is neither technical nor childish. Such special terms as are necessary for the purpose of exact description are explained in the index.

In the treatment of each country some deviation is made from the general plan common to all, in order to explain the peculiarities of its national life and to bring out its individuality. The structure of the region and its action on the race is the leading motive in the description of old countries; the reaction of the race on the region takes the first place in the description of new lands undergoing development; but in every case the ground-work is a true description of the country as it is to-day. Here, as well as in the avoidance of those errors which beset even the most careful compiler, this book has a special claim to consideration, because, with

few exceptions, each country is treated by an experienced traveller, a resident, or a native. The authorship may indeed be viewed as part of the subject, being itself an outcome of the land described.

Geography Defined.—The literal meaning of Geography—the Description ot the Earth—is limited by usage to the description of the Earth's surface; but the sense in which *description* is to be taken in this definition must be explained. That it is a *graphy* and not a *logy* has actually been brought forward by men otherwise worthy of respect as an argument against geography being a science. It need only be pointed out in reply that if a name derived from the Greek is necessarily a definition, astrology should still be held a science. The very first modern text-books of geography insisted strongly on the distinction between Chorography, or Topography, and Geography. A quaint diagram from the "Cosmographia" of Apian and Gemma Frisius in 1584 (Fig. 1), illustrates chorography, after Ptolemy by the metaphor of a small detailed sketch such as that of an eye or an ear, while geography is like the complete drawing of a portrait. The chorography of the old writers has too often been expounded and taught under the name of geography, and hence misconceptions have arisen. Geography is a part of that greater science which was called *Cosmography* in the Middle Ages and *Physiography*[1] in modern times; but it is something more. A formal definition of the modern science may be put thus:

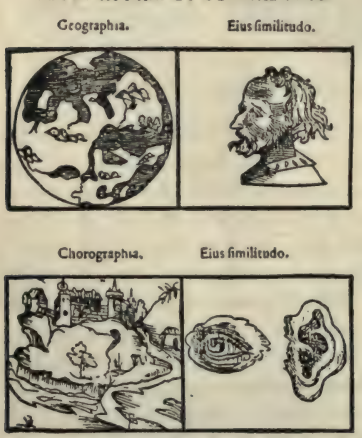

FIG 1.—*An Early Simile of Geography*

Geography is the exact and organised knowledge of the distribution of phenomena on the surface of the Earth, culminating in the explanation of the interaction of Man with his terrestrial environment.

The Position of Geography.—In the field of knowledge geography occupies a peculiar, even unique position. As the meeting-place of the physical and the human sciences, it is the focus at which the rays of natural science, history, and economics converge to illuminate the Earth in its relation to man. It is impossible to treat any natural, much more any human science as a portion of knowledge "clean-cut from out and off the illimitable," for the margins of all sciences are confluent. Geography is akin to physics in its organisation, inasmuch as it is a generalisation, or rather a

[1] Prof. Davis confines the name *physiography* to that department of physical geography which has been termed by other writers *geomorphology*, but the word was used in the general sense by Linnæus about 1736, and was popularised by Huxley in 1877.

synthesis, of units each of which may be viewed as a highly specialised branch of science in itself. The unity of physics results from the fact that the physicist looks on nature in the universal aspects of matter and energy; the unity of geography results from viewing nature in the limited but still general aspect of the phenomena which affect the surface of the Earth. The materials for bringing the generalising science of geography to the dignity of completeness, are not yet all collected; but the plan is already grandly outlined. Incompleteness of data, however, is an incentive to progress, and a guarantee of substantial advance being made when the right direction is foreshadowed by a theory. The theory of geography which gives life and unity to the details of topography, and the various facts borrowed from such cognate special sciences as astronomy, geology, oceanography, meteorology, and history is the far-reaching theory of evolution. Writing in the twentieth century it is scarcely necessary to point out that this theory is not antagonistic to the doctrine of creation. Evolution exhibits a constant succession of changes in a definite direction—from lower to higher, from simple to complex—inevitably suggesting some external guidance, and not touching the question of ultimate origin.

The Departments of Geography.—The subject-matter of geography may be classified in various ways, each representing an aspect from which the whole may be considered, but it is simplest to follow the order of evolution, selecting and arranging the divisions so that the classification becomes a statement of the principles of geography, in which each part depends on that which precedes and conditions that which follows. The fundamental department of geography views the Earth's surface from the standpoint of the one absolute science—Mathematics. It deals with the measurement of the Earth, the whole question of geodesy and surveying, and that of map-projections and map-construction. It takes account also of the strictly calculable phenomena of the Earth's movements and its relations to the other members of the solar system, ascertaining the times of the seasons and of the tides, and fixing the measure of time itself. *Mathematical Geography* presents us with a globe of a definite size, covered for a certain proportion of its surface to a particular depth by an ocean in which tides are raised by external attraction, rotating on a definite and practically unchanging axis and so acquiring the polarity which enables positions to be found both in latitude and longitude by reference to external bodies; the axis being so inclined to the plane of the orbit as to bring the succession of the seasons and the reciprocal swing of day and night differently to every zone of the surface.

This aspect passes directly into that of the less definitely known and less calculable phenomena of *Physical Geography*, which takes account of the differences in material and in function of the parts of the Earth—the rigid lithosphere, the mobile hydrosphere, and the all-embracing atmosphere. Geology, oceanography, and meteorology contribute to supply the

means of understanding the forms and functions of the Earth. The arrangement of the continental ridges above the hollow plains of the ocean, and the forms into which these ridges are wrought, acquire significance. The power of solar radiation calling into movement the currents of water and air, and the deviation in moving bodies due to rotation, firmly lock together the mathematical and physical aspects of geography. Physical geography finally shows us the spinning, tilted globe, throbbing with the innumerable activities which solar and telluric energy impart to terrestrial matter; sea and air beating upon the land and fashioning its scenery, while the mathematical bounds of climate are almost neutralised by rearrangements due to the interchange of tropical heat and polar cold. Throughout these actions the immense control exercised by land-forms is to be traced in the disturbances of the movements of air and water from the order which would prevail if a smooth ocean or an uncrumpled land-surface covered the whole Earth.

The carving of the crests of the land has yielded soft soil which swathes the lower slopes in flowing sheets warmed by the Sun and moistened by the shower; but bare soil or vacant sea or air do not meet the eye over the greater part of the globe's surface. Living things possess the world, and the purpose of *Biogeography* is to trace out the reasons why particular species occupy the regions where they are now found. The result shows that those conditions which form the subject of physical geography are the main controlling elements in the distribution of plants and animals. The regions of forest, steppe and desert are fixed by the form and position of the continents and by the climate, which in most cases is also largely dependent on the same control. Geography so far takes account of the greater part of one aspect of evolution, from the development of the solar system itself, following down the cooling Earth with its crumpling crust until the surface is covered with the products of life. Some geographers even bring in the layer of living matter to complete four parts of the physical globe—the lithosphere, hydrosphere, atmosphere and biosphere.

Amongst all the species of animals which dwell upon the land subject to the severe control of geographical environment one rises so far superior to the rest as to require a special division of geography to take account of its distribution. This is the human species. Alone amongst the animals man, in virtue of his higher intelligence, has the power, while always under the control of his surroundings, to react upon his environment in such a way as to render its action more beneficial to himself. By cultivation and breeding he alters the character and the distribution of plants and animals, by works of draining and irrigation he modifies the natural watering of the land, by cutting canals and building dykes he changes the relative positions of land and sea, even to the severance of continents. Engineering works enable him to overcome the resistance to free movement presented by vast stretches of waste land, great rivers, mountains, and the ocean

itself. The object of *Anthropogeography* is to study the distribution of the varieties of mankind, their degree of culture, and the manner of their groupings and movements. It is obvious that the whole of the other aspects of geography are tributary to this, and the greatness of anthropogeography and its practical importance make it necessary to subdivide it, the subdivisions being farther advances in evolution.

The distribution of man as an animal is merely one of the problems of biogeography ; the consideration of human activity on the Earth's surface is the main purpose of anthropogeography ; but when divisions of mankind acquire a higher civilisation and a firmer hold on definite regions of the Earth's surface, occupying them to the exclusion of other tribes, and, it may be, extending the territory by annexing that of neighbours, *Political Geography* acquires importance. It takes account of boundaries of settlements, sites of towns and ports, and the lines of travel or migration. Up to this point geography may be studied as a purely physical science, but here history has to be appealed to in order to understand how boundaries came to occupy their present position, and how the people possessing a country have entered or been formed in it in the past. Many other considerations also have weight ; strategic value, for example, converts into determining factors many features which are of no particular significance physically.

While the motives for distant travel have often been political—the outcome of military ambition—and often religious, at the prompting of missionary zeal, the chief cause which drives people to distant lands and guides migrations and colonisation is personal advantage. This may either take the wide form of economic necessity, due to the failure of supplies in the original home, or the more individual form of trading. *Commercial Geography* has to do mainly with the discovery, production, transport and exchange of useful and desirable things. In order to understand it the fashions and fancies of the various sections of the human race (*e. g.*, the purely fanciful value set upon the diamond) have to be considered, as well as the influence of historical tradition and of the laws of geographical distribution.

Geographical Changeableness. — From each successive point of view the phenomena to be taken account of in geography have become successively more complicated, more changeable and less predictable. The rigid degree-net of the mathematical geographer with its definite and unchangeable frigid, temperate and torrid zones, was represented as accurately five hundred years ago as now, and no change in it can ever occur. The data of physical geography are harder to discover, more laborious to acquire, and to some extent liable to change. We cannot as yet produce a perfect topographical map of the continents, nor a passable hypsographical map to show their elevations, nor anything more than a foreshadowing of a geological map of the world. Within historic times new islands have appeared, stretches of coast have been submerged,

shores built up into land, and old mountains have been shattered into dust by volcanic explosions. The natural divisions which separate distinct faunas and floras are still questions of dispute; no two biological maps are alike, and even if the distribution of species could be accurately charted to-day they would be antiquated to-morrow by natural changes. This tendency to grow out of date is still more marked in political maps. The frontiers of countries waver in the field of history; maps of Europe which were perfect in 1800 became nearly useless in 1815; and those justly viewed as excellent in 1870 had to be superseded in 1878. No map of South America can be coloured into countries in a manner acceptable in any two of its contiguous States. But all these aspects of geography are relatively permanent compared to the commercial as shown by the producing areas, markets and lines of transport and communication which appear in a commercial atlas. The customs barriers, more impenetrable in their way than any of nature, are continually shifting in position and varying in severity, old mines become exhausted and new ones are discovered, old lands pass out of cultivation, and new lands spring into importance through irrigation, even taste and fashion change, and with them the collecting grounds of the materials for their gratification.

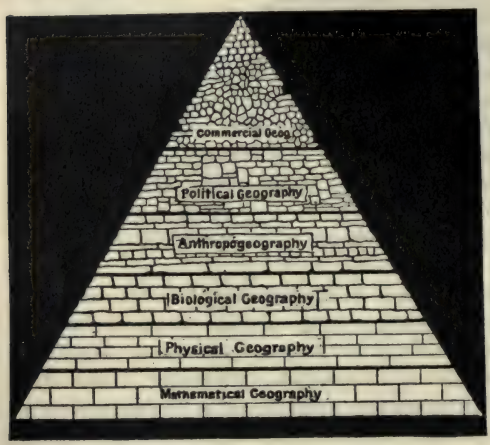

FIG. 2.—*The Departments of Geography.*

The Pyramid of Geography.—To summarise at a glance this scheme of the aspects and objects of geographical science we may consider them as forming a pyramid (Fig. 2), broad-based on the smooth hewn blocks of mathematics, rising through tiers of firmly laid stones from the quarries of the physical sciences, and the less sure products of biology and anthropology to the irregular courses of political geography and the rubble heap of commercial geography which caps if it does not crown the edifice. Here an extension of the metaphor may be permitted. The incoherent and shifting cap of the pyramid is not without its influence on the rest. As rain filtering through a great piece of masonry dissolves the mortar of the upper parts and redeposits it lower down, so the streams of economic interests have spread downwards through the whole structure of the geographical pyramid binding it together. Commercial motives consoli-

date national life, accentuate racial differences, redistribute animals and plants, modify physical conditions, start investigations into the nature of the Earth, and even invade the solid ground-work of mathematics with practical suggestions.

The Practical Value of Geography.—It may be that some readers are repelled rather than attracted by the foregoing attempt to explain the nature and contents of geographical science. If this be so it would be well to read carefully the description of some one country, and endeavour to trace out the part each separate aspect of geography plays in accounting for the character of the land, and the relation of its people to it. It is often supposed that while geography is very useful to the sailor, the soldier, the missionary, and the traveller, who have to go from place to place, or to the merchant who has trading interests in distant lands, it has little concern with the life of the stay-at-home citizen. This is quite a mistake. Many of the interests of the present day are largely geographical, and the daily paper acquires a fresh and fuller interest when it is read in this light. Even to know where the places one reads of are, what is their climate, and how they are peopled, is something; but, taking the wider view of geography as the science which aims at explaining the adjustment of people to land, there is scarcely a problem of past history or of present politics and economics in any country which cannot be elucidated by the application of its principles. When it is once realized that geography is not merely a description of the immobile surface of the Earth, but a comprehensive study of the influence which the land exercises on its people, and of the reaction of the people on their own and on other lands, the value of the science and its practical utility will reveal themselves in many ways. Some may perhaps consider that geography is made to include too much, that it is made the centre and the circumference of human knowledge; but this is simply an effect of perspective. Geography is not claimed to include the sciences whose results form its raw materials, any more than a house can be said to include the quarries, the forests and the mines which have yielded its stone and timber and metal-work.

The Course of Geographical Discovery.—The history of every branch of inquiry is full of value, and in the following articles there are many paragraphs dealing with the past events which have led to present conditions. There is not space here to allow of any attempt to give even an outline of the history of geographical discovery or geographical theories; but a few of the greatest landmarks must be recalled. The most ancient civilisations were those of the great nations which grew up on the plains of the Euphrates, the Nile, the Ganges, and the rivers of China. Each of these formed a centre whence the surrounding lands were explored to a certain extent and the results placed on record. The records, however, did not affect the farther progress of discovery. The *Mediterranean* or Græco-Roman civilisation was the centre whence grew, like spreading water-rings round the spot where a stone has fallen, the

wave of exploration which has revealed the world, and rendered possible the *Oceanic* or world-wide civilisation of the present.

Geography among the Greeks.—That the early Greeks viewed the world as a flat disc of land is revealed in Homeric poetry, and in the descriptions of the earliest maps like that of Hecatæus in B.C. 500 (Fig. 3). The Mediterranean Sea penetrating this land divided it into two parts—Asia and Europe. Round the circumference of the whole, at an unknown distance, ran the great Ocean River which connected all the seas. Herodotus recognised the Red Sea as separating the ancient "Asia" into two parts, Asia and Africa, and thus the three continents of the Old World were known and named before 430 B.C.

FIG. 3.—*The World according to Hecatæus.*

The coast of the Mediterranean was fully explored at a very early date, and colonies of Greeks established at favourable points. About 330 B.C. Pytheas, a Greek colonist of Marseilles, sailed out into the ocean, and explored its shore northward, discovering the British Islands. About the same time the armies of Alexander the Great extended the knowledge of the Greeks eastward as far as India; and the spherical form of the Earth, early suspected by Greek philosophers, was for the first time clearly proved by Aristotle. The attempt to fit the *œcumene* or known world to the sphere revealed the immensity of the unknown surface of the Earth, and gave opportunity for speculations as to the existence of inhabitants beyond the zone of killing heat to the south and near the region of fatal cold and darkness to the north (Fig. 4). It was easier from the development of mathematical astronomy to estimate the size of the globe than to measure the extent of the known lands, for although distances north and south were early found by astronomical observations, distances east and west could only be guessed at by estimates of the length of marches. Hence it happened that when Ptolemy of

FIG. 4.—*The World according to Pomponius Mela*, A.D. 47.

Alexandria produced his great work on geography in A.D. 150, he believed that the known land extended from west to east half way round the globe, *i. e.*, for 180° instead of 130°, as is the case. As he also adopted 21,000 miles as the value of the equatorial circumference of the Earth instead of nearly 25,000, he made out that the east coast of Asia was only about 9,000 miles west of the west coast of Europe. As he estimated the extent of the known land from north to south at only 80°, it was natural for him to use a word corresponding to *breadth* for this direction, and one corresponding to *length* for extension from west to east, and thus our words *latitude* and *longitude* had their origin. The most curious feature on Ptolemy's map (Fig. 5) is the great eastward extension of South Africa, which he believed to enclose the Indian Ocean on the south; this belief in a closed ocean did much to discourage attempts to reach India from Europe by sea. Ptolemy's work marked the culmination of ancient geography, and after it appeared no further advance was made for more than twelve centuries.

FIG. 5.—*The Known World according to Ptolemy*, A.D. 150.

Geography in the Middle Ages.—From the fall of the Roman Empire onwards geography shared in the general neglect of all natural science. The theory of the sphericity of the Earth was supposed to be in conflict with Scripture, and was consequently abandoned by the Christian monks who were the only upholders of any form of learning in Europe during the Middle Ages. They made a few fantastic guesses to account for such natural phenomena as they could not overlook; but they did some service to geography by recording the travels of many zealous missionaries, who penetrated to all parts of Europe and made some daring journeys through Asia. These records, however, were for the most part rendered ridiculous by the stories of mythical wonders which were accepted greedily in a credulous age. The great journey of Marco Polo (1271–1295) across Asia and through the eastern archipelagoes was made possible by the conquests of the Mongol emperor Jenghiz Khan, whose power, though a menace to Christian Europe, was a guarantee of peace and security throughout the vast breadth of Asia. The one class in Europe who utilised correct geographical methods at this period was the seafaring population of the Mediterranean, whose compass-charts of that sea were remarkably accurate. The Arabs, however, had kept up the knowledge of Ptolemy's work, which they had translated from the Greek;

Arab geographers throughout the Middle Ages were familiar with the spherical form of the Earth, and their travellers added much to the knowledge of the interior of Africa. The power of this cultured people was broken by the crusading armies and by the incursions of the barbarous Turks who, sweeping across Asia Minor, threw themselves into Europe, and capturing Constantinople in 1453 scattered all over Christendom the learned men who had preserved there the Greek language and literature. From this time onwards Ptolemy's work, which was translated into Latin and printed in 1462, was accepted as the standard in all matters of geography, until the great explorations of the succeeding period made fresh works necessary.

The Era of Voyages of Discovery.—The desire to find a sea-route from the Mediterranean to the spice-yielding lands of the East was greatly strengthened in the first quarter of the fifteenth century by the hampering of the overland Eastern trade by the Turks. About 1418 Prince Henry of Portugal, subsequently surnamed the Navigator, devoted himself to the encouragement of exploration along the coast of Africa with the object of seeing whether there might not be a passage into the Indian Ocean on the south. This work was continued after his death in 1460, until Bartholomew Diaz, in 1486, rounded the Cape of Good Hope. About this time maps were constructed in which the exaggerated breadth of Asia assigned by Ptolemy was increased from the interpretation of Marco Polo's routes, so that Japan was made to appear only 8,000 miles west of Portugal. From the study of these maps Christopher Columbus was convinced that Asia could most easily be reached by sailing west. In 1492, after years of effort, he succeeded in getting ships from Spain, and in little more than two months' voyage he discovered new islands which he named the West Indies because he believed them to lie off the coast of Asia. The excitement created in Europe on his return was immense, and at once inaugurated a period of the most daring sea-voyages known to history. It was followed by the re-discovery of North America by Cabot, the gradual feeling out of the great continent of the New World which barred all prospect of sailing directly west, and by the first sea-voyage to India by Vasco da Gama in 1498, following up the Eastern route so long advocated by Prince Henry. The keenness of the rivalry of Portugal on the eastward passage and Spain on the westward led to the rapid exploration of the new coasts and an almost desperate search for some way round America by the north or by the south. This culminated in the most splendid feat of human daring at sea, the voyage of Magellan through his strait and across the Pacific in 1520. The return of his expedition by the Cape of Good Hope, after finding the western route to the Spice Islands, placed the true form of the Earth beyond doubt for ever, even to the least imaginative; and so closed the brilliant quarter century which had pushed the Mediterranean, from all antiquity the centre of the world, to one side, off the main tracks of trade.

Later Explorations.—Throughout the sixteenth and seventeenth centuries the merchant adventurers of northern Europe reaped the full advantage of their newly discovered position in the centre of the oceanic world, and planted their colonies and trading posts almost on every shore. Australia was discovered, though its importance was not recognised. The efforts to find a north-west and north-east passage to India were continued valiantly, but they failed to do more than open up new fishing grounds. While travellers brought back reports of their discoveries, the geographers and cartographers of Europe were engaged in producing annotated editions of Ptolemy and new text-books and atlases setting forth the new facts. Amongst them were the great cartographers of Flanders and the Netherlands—Mercator, Ortelius, and Blaeu, and such authors as Waldseemüller (who in 1507 first proposed the name *America*), Munster, whose *Cosmographia* of 1544 is a curious blending of old legend with new fact, and Varenius, who first gave expression to modern theories. Athanasius Kircher, though given to fantastic speculations, greatly promoted the study of physical geography in the seventeenth century.

The Eighteenth Century.—Notable advances in the art of navigation, especially the invention of the sextant and the perfection of the chronometer, enabled the positions of distant places to be fixed for the first time with accuracy, and detailed surveys of coasts and countries were set on foot. Arcs of the meridian were measured with a high degree of precision, and the true dimensions of the Earth became known. Much of the interior of North America was explored, and the coasts of the Pacific charted for the first time. Captain James Cook stands out pre-eminent amongst the numerous bold maritime explorers of the century, for he combined for the first time scientific method, nautical skill and indomitable enterprise. In his first great voyage of circumnavigation (1768–71) he surveyed the coasts of New Zealand and the east of Australia. In his second (1772–75) he circumnavigated the world close to the Antarctic Circle and put a stop to the agreeable illusion that a vast temperate southern continent existed. In his third voyage (1776–79) he surveyed much of the west coast of North America, and discovered the Sandwich Islands where his splendid career came to an untimely end. The French geographer, D'Anville, is memorable not so much because he filled the maps of the period with fresh details, but because he subjected all the data from which maps had previously been compiled to the most rigorous criticism, and rejected everything which was conjectural, or could not be verified.

The Nineteenth Century and After.—The advances made during the nineteenth century were so great that this volume is largely a summary of the results then attained. Africa and Australia were completely explored, parts of Asia were traversed for the first time since Marco Polo passed that way; the area of the unknown polar regions was much reduced; the whole of America roughly surveyed, and practically all Europe mapped with high accuracy. Geological sur-

veys have followed the topographical in all civilised and in many undeveloped countries, and the distribution of plants and animals has been widely and systematically studied. The cruise of H.M.S. *Challenger* (1872–76) was by far the greatest voyage of purely scientific investigation ever attempted, and it has thrown a flood of light on the conditions of the oceans and of oceanic islands. Although separated by almost a hundred years A. von Humboldt, who explored Central and South America and parts of Asia, and Fridtjof Nansen, who approached nearer the North Pole than any man before him, may be taken as representative types of the scientific travellers of the nineteenth century. Of naturalist travellers A. Russel Wallace may be specially named. In the great army of missionary explorers David Livingstone stands pre-eminent; and amongst those actuated by other aims, no name approaches that of H. M. Stanley. The modern developments of cartography are best illustrated in the work of Sticler, Arrowsmith, Petermann, A. Keith Johnston, and J. G. Bartholomew; and large modern text-books by the great works of Malte-Brun commenced in the first decade, and of Elisée Reclus completed in the last decade of the nineteenth century. The leaders in the science whose work has been most fruitful in guiding the researches and forming the opinions of recent geographers were Humboldt, Ritter, and Peschel, to whose influence the remarkable development of higher geographical learning in Germany may be directly traced. But Charles Darwin, not so much by his researches in physical geography, though they are important, as by his services in establishing and making familiar the theory of evolution, has done more than any geographer of the nineteenth century to advance the science by popularising the co-ordinating clue which unifies it.

The Progress of Geography.—While progress in most sciences in all countries has been largely due to the work of University professors whose duty it is to study and to teach it, geography has, until very recently, been served rather by the voluntary association of persons interested, who have formed geographical societies in all parts of the world. The first was founded at Paris in 1821, the second at Berlin in 1828, and the third, which is now the most influential, at London in 1830. The largest is the National Geographic Society at Washington which had 30,000 members in 1908. There were in 1901 no less than 89 active geographical societies in Europe with more than 60,000 members, 6 in Asia, 8 in North America, 5 in South America, 3 in Africa and 4 in Australia; 115 altogether. There are also more than 150 different geographical journals or magazines published regularly in all parts of the world. It may safely be said that this argues a more wide-spread interest in geography than exists in any other science; and the reason for that interest is that geography is of practical every-day utility to the average citizen of the world.

The accompanying map (Fig. 6) shows graphically how far the foundations of geography have been laid by exact surveys, and how in the polar regions, in the heart of Asia, Africa and South America there still remain somewhat extensive areas concerning which we are absolutely ignorant.

But these will be filled up before long, and the threat has been heard that then the geographer will have no more work to do. This is, however, a mistake. The geographer will only then be able to begin his real work. He will have to secure geological, biological and anthropological surveys of equal quality, and then at last all the data will be complete to his hands

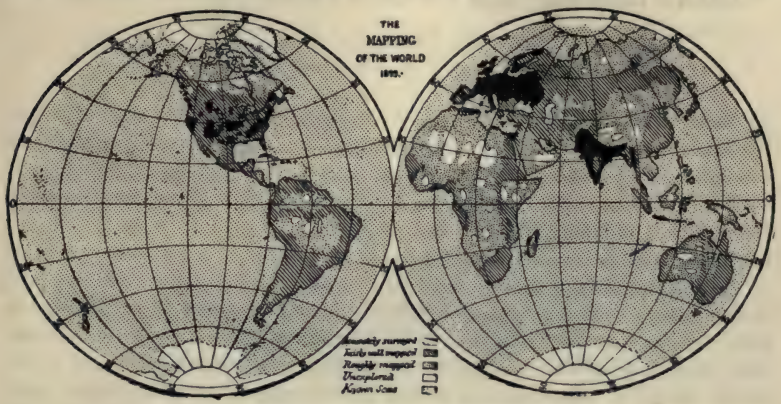

FIG. 6.—*The Value of the Maps of the World.*

for perfecting the theory which explains the relation of man to his terrestrial home.

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CHAPTER II.—MATHEMATICAL GEOGRAPHY

By A. M. W. Downing, D.Sc., F.R.S.,
Superintendent of the "Nautical Almanac."

Mathematical Geography deals with the form and dimensions of the Earth, and the methods employed for determining and representing the positions of places upon its surface. In this chapter we shall also have occasion to refer to the Seasons and Tides as phenomena arising from the influence of the Sun and Moon upon the Earth, which are of the utmost importance in the economy of the latter considered as a habitable planet.

The general idea of the rotundity of the Earth is one that has long been familiar, and may readily be inferred from a variety of easily observable phenomena. Probably the most convincing of these is the observation that the outline of the shadow of the Earth, as seen upon the disc of the Moon during a lunar eclipse, is that which only a spherical body could produce. The Earth, therefore, we may conclude is spherical, or nearly spherical, in form, and (as it can be circumnavigated) is limited in extent.

To determine accurately the form and dimensions of the Earth—by which we mean those of the surface of the ocean as they would be if the ocean covered the entire Earth—recourse must be had to measurements on the Earth's surface, in combination with observations of the stars. And it is to be noted that observations of the stars are valuable in this connection on account of their vast distances from the Earth. The Earth's diameter is found to be insignificant when compared with the distances of the stars, and the latter can, accordingly, be used as fixed marks of reference, possessing this important property—that lines proceeding from distant parts of the Earth's surface to the same star may be considered to be strictly parallel. But this is not so in the case of bodies comparatively near us, such as the Sun or Moon. It is necessary to apply corrections to the observed positions of these to reduce them to what they would have been had the observations been made at the centre of the Earth. This is called the correction for parallax.

Definitions of Terms.—At this point it will be convenient to introduce the definitions of certain terms, some of which will be frequently employed in the subsequent pages of this chapter. It is assumed that the reader is familiar with the ordinary phenomena due to the rotation of the Earth on its axis; how each of the heavenly bodies appears to rise in the east, to attain a certain maximum altitude depending on its position, and then to set in the west; how certain of the stars appear to observers in the northern or southern hemisphere never to rise or set, but to describe

circles round points in the heavens called respectively the north and south poles. And we assume that the reader is aware that these phenomena are due to the fact that the Earth rotates round an axis which is situated in the direction of the line joining the north and south poles of the heavens.

The *Poles* of the Earth are the points in which its axis meets the surface —north and south respectively.

The *Equator* is the circle described round the Earth at an equal distance from the poles, and dividing it into two hemispheres. The plane of this circle passes through the centre, and is at right angles to the axis.

The *Celestial Equator* is the circle marked out in the heavens by the extension of the plane of the terrestrial equator to meet the vault of the sky.

The *Zenith* is the point overhead of the observer where a plumb-line suspended at his station would pierce the sky if produced upwards ; the point opposite to the zenith (underfoot, of course) is called the *Nadir*.

The *Visible* or *Sensible Horizon* is the circle traced out by the extremities of a plane passing through any place on the Earth's surface, and perpendicular to the line joining the zenith and nadir of the place. The *Rational Horizon* is the circle traced out by the extremities of a plane passing through the Earth's centre, and parallel to the sensible horizon. It should be noted that, on the immensely distant surface of the celestial vault, the two traces referred to sensibly coalesce into one single circle, which will hereafter be called the *horizon*.

Vertical Circles are great circles of the celestial sphere (*i.e.*, circles whose planes pass through the centre of the sphere) drawn through the zenith and nadir, and perpendicular to the horizon.

The *Altitude* of an object is measured on the vertical circle passing through it, and is its angular distance from the point of intersection of the vertical circle with the horizon.

The *Zenith Distance* is measured on the same circle, but from the zenith instead of from the horizon. It is, therefore, the complement of the altitude.

The *Azimuth* of an object is the angular distance of the point of intersection of the vertical circle passing through it with the horizon, measured from the north or south point of the horizon.

Hour-Circles are great circles passing through the poles of the celestial sphere, and therefore perpendicular to the celestial equator.

The *Meridian* is the great circle passing through the zenith and the poles ; the terrestrial meridian being the trace of the plane of this circle on the Earth's surface. The meridian intersects the horizon at the north and south points of the latter. The meridian marks the point of greatest altitude in the apparent diurnal path of each star, due to the Earth's rotation.

The *Hour-Angle* of a celestial object is the angle at the pole between the meridian and the hour-circle passing through the object. It evidently is zero when the object is on the meridian.

The *Latitude* of a place on the Earth's surface is the angle between its plumb-line and the plane of the equator. If the Earth were a perfect

sphere, the direction of the plumb-line at any place on the Earth's surface would coincide with the direction of the line drawn from the point to the centre. But, as we shall see presently, the figure of the Earth deviates slightly from that of a sphere, and geographical latitude must be referred to the direction of gravity, not to that of the Earth's radius, at the place. Latitude is measured from 0° at the equator up to 90°, north or south, at either pole.

The *Longitude* of a place on the Earth's surface is the angle at the pole between the initial meridian (that of Greenwich, for instance) and the meridian passing through the place. It is measured from 0°, at the initial meridian, up to 180°, east or west.

Determination of Latitude.—The fundamental proposition with regard to latitudes on the Earth's surface (which is assumed in every method used for determining latitudes) is that the latitude of a place equals the altitude of the celestial pole.

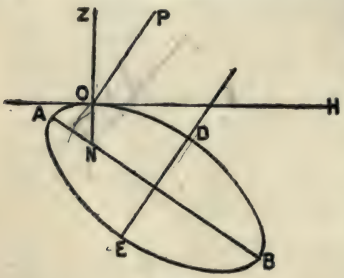

FIG. 7.

This will be clear from Fig. 7, in which ADBE represents the terrestrial meridian of the place (its ellipticity enormously exaggerated), AB the equatorial, and DE the polar diameter of the Earth, O the position of the observer, Z his zenith, and OH the horizontal plane. Through O draw OP parallel to DE, which is the direction of the celestial pole. The altitude of the pole is POH, and the latitude of O is ZNA, from the definition given above. But these angles are equal, as OP is perpendicular to AB, and ZN is perpendicular to OH.

To determine the latitude of a place it is, therefore, only necessary to find the altitude of the celestial pole at that place. The most obvious way of doing this is to select a circumpolar star, *i.e.*, a star which appears to describe a circle round the pole without ever setting below the horizon. The altitude of this star should be measured at its upper meridian passage, and again at its lower meridian passage (between the pole and the horizon), and the half sum of these altitudes, when corrected for refraction, will be the altitude of the pole.

The latitude can also be determined by observing the meridian altitude of a celestial body whose position is known. Let HZN (Fig. 8) be the meridian, Z the zenith, P the pole, S the known body passing the meridian, and HN the horizon. As the position of the body is known, the angular distance from the pole, PS, is known, and the angular distance HS is the observed altitude. Therefore PH is known, which, taken from 180°, gives PN the altitude of the pole, or the latitude.

The latitude at sea, or in an unsettled country, is generally found by observing, with a sextant, the Sun's maximum altitude, which of course

occurs at noon. The sun is watched for some time before reputed noon, until it is observed that his altitude has ceased to increase. The maximum value is then recorded, which, when the proper corrections are applied, gives the latitude in accordance with the foregoing method.

Determination of Longitude. — The difference of longitude between any two places on the Earth's surface is simply the difference of local times at the two places at the same instant of absolute time. The determination of the longitude of any place, therefore, involves the two operations of finding the local time, and comparing it with the corresponding time of the initial meridian.

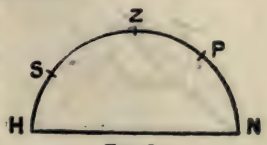

FIG. 8.

Time is measured by the rotation of the Earth on its axis. The interval between two successive passages over the same meridian of a star is called a sidereal day, and of the Sun a solar day. Owing to the fact that the motion of the Earth in its orbit round the Sun is unequal at different times of the year, the solar day, as above defined, is not of constant length. At one time of the year a longer interval elapses between successive passages of the Sun over a meridian than at another. On this account the actual solar day is unsuitable as a measure of time for practical purposes. In its place we use the average solar day as a standard of measurement, and time thus measured by a mean Sun is called mean solar time. It is to this time that our clocks are regulated. The time shown by a sun-dial is true, or, as it is called, apparent solar time. The difference between mean and apparent solar time is called the equation of time. When the Sun's centre is exactly on the meridian of any place it is, of course, apparent noon at all places situated on that meridian. The equation of time being applied, we have, then, the instant of mean noon at all these places. Now in twenty-four mean solar hours the mean Sun passes over every meridian in succession, or over 360°, so that in one hour he moves from one meridian to another which is 15° to the west of it ; and so on at the same rate throughout the twenty-four hours. It is this consideration that enables us to convert differences of local times into differences of longitude. A little consideration will show that when it is noon on the initial meridian (that of Greenwich, for instance) it is earlier for places to the west of Greenwich by the amount of one hour for each 15° of west longitude ; and similarly it is later for all places to the east of Greenwich.

The first requisite, then, for the determination of the longitude of a place is to find the local time. This may be effected by observing when the Sun or a known star passes the meridian. But the navigator or traveller generally determines time by observing, with a sextant, the altitude of the Sun when at a distance from the meridian. This method assumes that the latitude of the place is known. In the triangle PZS (Fig. 9) where P is the pole, Z the zenith, and S the Sun, the side PZ, being

the complement of the latitude, is known, also PS, the distance of the Sun from the pole is known, and ZS, the zenith distance, is the complement of the observed altitude. From these data the hour-angle ZPS is found, and hence the interval from noon, and finally the mean time. The difficulty in the determination of longitude consists in finding the corresponding time on the initial meridian. The most obvious way of doing this is to carry a chronometer, which indicates it; and this is the practice resorted to on board ship. If chronometers could be constructed which would maintain their rate for an indefinite time, notwithstanding changes of temperature or other disturbing causes, there would be no further difficulty. But this is still far from being the case, and other expedients have to be resorted to either where greater accuracy than can be obtained by relying on a chronometer is desired, or where, from any circumstance, it is found impossible to employ this method. The most accurate method, and that which has superseded all others where its use is practicable, is the transmission of time-signals by telegraph. The local time, as determined on any meridian, is telegraphed to the station on the initial meridian, which in turn sends its local time to the first station, and thus the difference of local times at the two stations is recorded at each station. Where the telegraph is not available, recourse must be had to the observation of some astronomical phenomenon, the time of the occurrence of which on the initial meridian is known, or may be ascertained. Of these we may mention the measurement of the distances of the Moon from certain bright stars, technically called the lunar-distance method, and the observation of the times of disappearance or of reappearance of stars at their occultation by the Moon, a method which is susceptible of great accuracy in the hands of skilful observers.

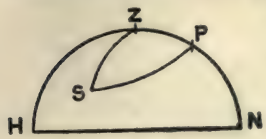

FIG. 9.

It may be noted that all the mathematical and astronomical data of use to navigators and travellers are published annually in the *Nautical Almanac*, compiled for the British Government, and similar publications issued by other nations. The necessary calculations are made so far in advance as to allow these ephemerides to be published two or three years ahead of the year to which they refer.

It is evident that the exact position of a place on the Earth's surface is known when its longitude and latitude are known. The longitude tells us on what meridian the place is situated; the latitude, its angular distance from the equator measured on that meridian. These two quantities are called the *co-ordinates* of the place. With the third co-ordinate, *i.e.*, the altitude of the place above the mean sea-level, we need not concern ourselves here. Two co-ordinates are always sufficient to fix the position of a point on a suface.

Form and Magnitude of the Earth.—Having the means of

determining the latitudes and longitudes of places on the Earth's surface, we are in a position to ascertain its exact form and dimensions. In order to effect this, it is necessary to measure the exact number of feet or miles between points, in different parts of the Earth, which differ in longitude or latitude by an ascertained number of degrees. The methods employed to effect the accurate measurement of great distances on the Earth's surface by means of a trigonometrical survey form an essential part of geodesy, into the details of which we cannot enter. Suffice it to say that by means of an elaborate system of measurements, such as are referred to above, the general shape of the terrestrial meridians has been ascertained to be that of an ellipse ; and the general figure of the Earth to be that which would be produced by the revolution of an ellipse round its shorter axis, or a *spheroid of revolution*, as it is technically called.

The semi-axes of these meridianal ellipses, or the equatorial and polar radii of the Earth, are 20,926,202 feet and 20,854,895 feet respectively, and the ratio of their difference to the equatorial radius, or the ellipticity of a meridian, is $\frac{1}{293\frac{1}{485}}$. The uncertainty attaching to these values of the Earth's radii may be taken to be about 235 feet in excess or defect. The length of a degree of latitude and of a degree of longitude in any latitude ϕ may be found in feet from the formulæ :—

$$1^\circ \text{ of Latitude} = 364{,}609{\cdot}12 - 1{,}866{\cdot}72 \cos 2\phi + 3{\cdot}98 \cos 4\phi$$
$$1^\circ \text{ of Longitude} = 365{,}542{\cdot}52 \cos \phi - 311{\cdot}80 \cos 3\phi + 0{\cdot}40 \cos 5\phi.$$

A table giving the lengths for every 5° of latitude, computed from these formulæ, will be found at the end of the chapter. It should be noted that some of the measurements that have been made appear to indicate that the equator of the Earth is not a true circle (as is assumed above), but an ellipse differing slightly from a circle, the difference between the semi-axes being about 1,500 feet. In the present state of our knowledge, however, it is better to assume a regular spheroid for the standard surface of the Earth, and to regard all variations from it as local or accidental phenomena.

There are two other methods of ascertaining the form of the Earth which are quite independent of that referred to above, and of each other, which may be mentioned. One is from observations of the variation of the force of gravity at different places on the Earth's surface ; the other is from observations of the Moon, some of the irregularities in whose motions are due to the deviation of the figure of the Earth from a sphere. The results of these methods are fairly in accordance with the more direct measurements.

The flattening at the poles of the Earth is a necessary consequence of its rotation, and may be mentioned as affording evidence of it.

The Use of the Globes.—In order to utilise fully our knowledge of the form and dimensions of the Earth, it is necessary that we should be able to represent the whole, or portions of it, on a convenient scale, to which refer-

ence may be made as occasion may require. Representations of the Earth in the form of a globe, or of maps, must now, therefore, occupy our attention. The terrestrial globe is obviously the most simple, and in some ways the most accurate, form of representation. When constructed of an easily manageable size, it is not possible to represent the Earth as other than a perfect sphere, the difference between the equatorial and polar radii, which amounts to 13½ miles, being too small a quantity to be shown on an ordinary globe. For the same reason the spherical surface is represented as everywhere perfectly smooth; even the highest mountains being insignificant on the scale we are considering. It is important, however, to notice that it is only on a spherical surface that the different countries, seas, &c., of the Earth can be represented in their proper proportions throughout the whole extent of the surface. And that when represented on a plane surface, as in maps, there must necessarily be distortion of some of the parts. In this respect the globe has an immense superiority over the map.

It is assumed that the reader is familiar with the properties and ordinary uses of a terrestrial globe; that he knows, for instance, that the circles of latitude are all parallel to the equator (hence called parallels of latitude), and are all, except the equator itself, small circles of the sphere. Also that the meridians all pass through the pole, and are all equal great circles; that the degrees of latitude are equal to each other throughout, and that a degree of longitude in latitude ϕ equals the equatorial degree multiplied by Cos ϕ. The globe, as ordinarily used, affords a rough and ready method of solving problems, the accurate solution of which requires a knowledge of spherical trigonometry.

Map Projections.—The globe is not, for most practical purposes, a suitable instrument for the representation of the Earth's surface. For this purpose maps are usually employed, when portions of the surface are required to be represented in a more convenient form. A map is nothing more than a representation, upon a plane, of some portion of the surface of a sphere. But as it is impossible to make a spherical surface coincide exactly with a flat surface, no map can represent the different portions of the Earth in their true magnitudes and true relative positions. In the construction of maps, therefore, various methods of projection (as it is termed) are adopted, so as to give results that may be most suitable for the particular ends in view. Some of the methods are perspective representations of the Earth as it would appear to an eye placed in certain positions with regard to its surface. These are chiefly employed in the representation of hemispheres. Other methods are developments of parts of the Earth's surface, and are only suitable for the accurate representation of restricted portions. We proceed to describe a few of the more important projections, premising that, in what follows, we neglect the ellipticity of the Earth.

Perspective Projections.—The perspective representation of an object will be different according to the position which the eye occupies

with regard to the object, and to the plane of projection, or surface on which the representation is made. In projecting hemispheres the eye is supposed to be placed vertically above or below the plane of projection, which is always that of a great circle of the sphere. The position of the eye determines the character of the projection. Those most commonly employed are the Orthographic, the Stereographic, and the Equidistant.

FIG. 10.

In the *Orthographic projection* the eye is supposed to be placed at an infinite distance, so that all lines drawn from it to the object may be considered parallel. Every point of the hemisphere is, therefore, referred to the plane of projection by a perpendicular let fall on it, and in this way a representation of the hemisphere is mapped on its base. It is obvious, from Fig. 10, that only the central portions are truly represented in this projection, whilst the outlying portions are greatly distorted and diminished in size.

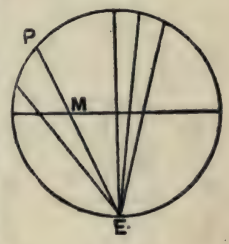

FIG. 11.

In the *Stereographic projection* the eye is supposed to be placed on the surface of the sphere at E (Fig. 11), and to view the concave surface of the opposite hemisphere, every point of which, as P, is referred to the plane of projection by the line PME. In this projection the similarity of portions of the spherical surface is better preserved than in the preceding one. The projected dimensions are, however, distorted in a contrary manner, being unduly enlarged in receding from the centre.

As when the eye is supposed to be placed at an infinite distance the outlying portions of the map are unduly diminished, and when the eye is supposed to be on the surface of the globe the outlying portions are unduly enlarged, there will be some intermediate position of the eye where one of these distortions will counteract the other. This is the principle of the *Equidistant projection*, or the *Globular projection*, as it is sometimes called. In this the eye is supposed to be at E (Fig. 12) on the diameter of the sphere perpendicular to the plane of projection, and at a distance from the surface EB = radius $\times \frac{1}{\sqrt{2}}$ If then P be the middle point of the quadrant AD, it is referred to the plane of projection by the line PME, and, by the principles of elementary geometry, OM = MD. And we shall find that other equal arcs on the hemisphere are projected into nearly equal lines. In the equidistant projection the relative dimensions of the objects delineated are therefore much better preserved than in those previously described. It does not,

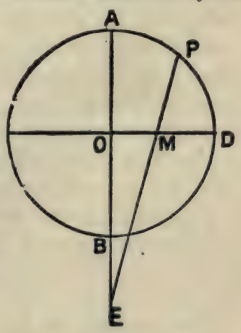

FIG. 12.

however, exhibit figures similar to those on the sphere, and in this important particular is inferior to the stereographic projection. Its special value is for the representation of distributions in which it is desired to compare areas by measurement.

Conical Projections.—It is a well-known property of a cone that its curved surface can be spread out, or developed on a plane, without any alteration in the figure and dimensions of its parts. This property is made use of in the *Conical projection*. A part of the Earth's surface lying between two parallels of latitude, not very distant from each other, ABCD (Fig. 13), will not differ much from part of the surface of a cone, OPQ, whose axis coincides with the polar axis of the sphere and which touches the sphere midway between the parallels. And if the latter surface be developed on a plane, the countries, &c., may be delineated in more exact proportions than in any of the perspective projections. The parallels of latitude will be represented on the surface of the cone by circles described with its apex (O) as centre, and passing through points on OP which are at distances from the points of contact P, equal to those which the parallels occupy on the sphere. The meridians will be straight lines (OP, OQ) drawn from the apex to the points in which the meridians on the sphere intersect the middle parallel of latitude. It is obvious that, in this projection, the dimensions are strictly preserved for the middle latitude only. On this account modifications of it are often employed to obviate the increase in the distances measured along the parallel above or below the middle latitude. One of these consists in the substitution of curves for straight lines to represent meridians. In this modification the degrees of longitude are marked upon each parallel in their proper proportion, and curved lines are drawn through the corresponding points.

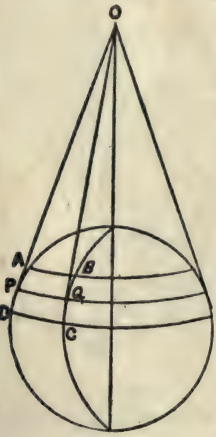

FIG. 13.

Another modification of the conical projection consists in regarding the cone not as touching the sphere, but as intersecting it; so as, for instance, to intersect it at two parallels equally distant from the middle latitude. This arrangement enables the geographer to embrace a considerably wider zone in latitude in his map, whilst preserving an extremely near approximation to exactness in his representation.

Mercator's Projection.—The last kind of projection to which we will refer is that known as *Mercator's projection*. In this projection a cylinder is supposed to circumscribe the sphere, touching it at the equator. The points on the sphere are referred to the cylinder by lines drawn from the centre. The cylinder is then unrolled into a plane. The equator is represented by a straight line, and the meridians by straight

lines at right angles to it, and all at equal distances from each other. The parallels of latitude are also straight lines. But as the degrees of longitude are, in this projection, made equal at all latitudes, in order to preserve the proper proportion, the degrees of latitude are increased on the map in the same ratio as the degrees of longitude are diminished on the sphere. This projection gives a true representation as to form, but varies greatly in the scale of different parts. The polar regions are, of course, enormously enlarged. Though not very suitable, therefore, for strictly geographical purposes, charts drawn on Mercator's projection are of the greatest importance for navigation, arising from the fact that the meridians and parallels are represented on them by straight lines. On this account the course of a ship from point to point will also be represented by a straight line; the rhumb line, or line intersecting the meridians at a constant angle, being, in this case, a straight line. In the other projections considered the rhumb line would be, in most cases, an inconvenient curve. The advantages of Mercator's projection, in laying down the course of a ship, are therefore sufficiently obvious, and, except for voyages in very high latitudes, charts constructed on this principle are always used for navigational purposes.

Great Circle Courses.—The navigator, as a rule, guides his vessel between any two places by sailing along a line which corresponds in direction with one of the points of the compass. It is obvious, however, that this course will not, in general, lie along a great circle of the sphere; in which case it will not be the shortest distance between the two points. It is sometimes found desirable, in practice, for a ship to adopt "great circle" sailing (as it is called) in preference to the more usual "Mercator" sailing. The direction and length of the arc of a great circle joining any two places are calculated by the rules of spherical trigonometry from their latitudes and difference of longitudes. And it is found that the economy in distance in great-circle sailing is greatest in high latitudes between places not differing much in latitude. Thus in sailing between Cape Horn and the Cape of Good Hope, a saving of 200 miles is effected by adopting the great-circle route.

Duration of Daylight.—The variations of the seasons depend on the inclination of the Earth's axis of rotation to the plane of her orbit, or the ecliptic. This inclination is about $66\frac{1}{2}°$, and the axis remains sensibly parallel to itself during the year. About March 20th the Earth is so situated that the plane of her equator passes through the Sun, and therefore the line separating the illuminated from the unilluminated portions of the Earth passes through the poles, or day and night are everywhere equal. The same thing happens on September 22nd, when the Earth reaches the opposite point of her orbit.

On June 21st the Earth is so situated that its north pole is inclined towards the Sun by $23\frac{1}{2}°$, so that that pole then receives sunlight throughout the twenty-four hours, as well as all the region lying within the Arctic

circle, *i.e.*, within a distance of 23½° from the pole. And everywhere in the northern hemisphere the day is longer than the night, the difference in length depending on the latitude. At the same time in the southern hemisphere the days are shorter than the nights ; whilst at the south pole, and over the region extending 23½° around it, which lies within the Antarctic circle, it is continual night. It will be understood, then, that from March 20th to September 22nd the days in the northern hemisphere are longer than the nights, and it is summer for that hemisphere. During the same period, in the southern hemisphere, the nights are longer than the days, and it is winter there.

During the winter months of the northern hemisphere these conditions are, of course, reversed, whilst at the equator the day and night are of equal length at all times of the year.

These results are, however, somewhat modified when we take into account the effect of refraction in increasing the apparent altitude of the Sun, as is done in the table below. Thus in latitude 65° 55′, owing to the effect of refraction in increasing the apparent altitude, the Sun's centre appears just on the horizon at midnight at the summer solstice ; whilst at the winter solstice, in this latitude, the Sun's centre is above the horizon for 2h. 38m. In latitude 67° 10′, owing to the same cause, the Sun's centre appears just on the horizon at noon at the winter solstice ; whilst at the summer solstice, in this latitude, the Sun's centre is above the horizon for twenty-four hours. Between these limits of latitude, therefore, there is a twenty-four-hour day at midsummer, but not a twenty-four-hour night at midwinter.

Tides.—The Tides consist of the regular rise and fall of the water of the ocean, the average interval between successive corresponding high waters at any place being about 24h. 50m. But this is also the average interval between two successive passages of the Moon across the meridian. It is also observed that, at a given place, the time of high water occurs when the Moon has passed the meridian by a certain interval, and again when the Moon has passed the anti-meridian (or the meridian 180° distant) by the same interval. These phenomena at once suggest that there is a causal connection between the Moon and the tides.

The Sun produces a tide as well as the Moon, but much less in amount on account of its greater distance. The effect of the Sun's action is apparent at new and full Moon, when the tide-raising forces due to the two bodies act conjointly and produce the magnified effect known as spring-tides. Also when the Moon is in the first or third quarter the forces act against each other, thus producing the neap-tides, in which the ebb and flow are less than the average.

It is impossible within the limits of a short chapter, descriptive of the general features of mathematical geography, to discuss the theory of the tide-raising power of the Moon and Sun exercised by their differential attraction on opposite sides of the Earth. This must be sought for in special treatises.

TABLE GIVING THE LENGTHS IN BRITISH FEET OF 1° OF LATITUDE AND 1° OF LONGITUDE AT DIFFERENT LATITUDES, AND MAXIMUM AND MINIMUM NUMBER OF HOURS PER DAY DURING WHICH THE SUN'S CENTRE IS ABOVE THE HORIZON, ALLOWING FOR REFRACTION.

Latitude.	Length of 1° of Latitude.	Length of 1° of Longitude.	Above Horizon. Summer Solstice.	Above Horizon. Winter Solstice.	Latitude.
°			H. M.	H. M.	°
0	362,746	365,231	12 6	12 6	0
5	362,774	363,851	12 22	11 48	5
10	362,858	359,719	12 38	11 30	10
15	362,995	352,866	12 58	11 12	15
20	363,180	343,342	13 18	10 52	20
25	363,408	331,213	13 38	10 32	25
30	363,674	316,569	14 0	10 10	30
35	363,968	299,515	14 28	9 44	35
40	364,281	280,177	14 58	9 16	40
45	364,605	258,698	15 32	8 42	45
50	364,930	235,236	16 18	8 0	50
55	365,245	209,967	17 16	7 4	55
60	365,540	183,083	18 44	5 44	60
65	365,808	154,787	21 46	3 24	65
70	366,040	125,293	24 0	0 0	70
75	366,228	94 830	24 0	0 0	75
80	366,366	63,632	24 0	0 0	80
85	366,451	31,940	24 0	0 0	85
90	366,480	0	24 0	0 0	90

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CHAPTER III.—MAPS AND MAP READING

By E. G. Ravenstein.

Maps and their History.—A map (from *mappa*, napkin) is a delineation on a plane of the whole or of a portion of the surface of the Earth. A collection of maps is called an Atlas, a term introduced by Mercator, who explains the meaning of the word he chose by a figure of the Titan of that name bearing a globe upon his shoulders.

Maps are of very ancient origin. The land surveyors of the civilised states of antiquity undoubtedly produced plans which met all practical requirements, whilst the needs of the navigator were served by Peripli and charts. At a very early age, too, these plans, combined with the information collected by travellers, were utilised in the production of maps of provinces and even of the whole of the habitable world. When Hecatæus (500 B.C.) warned his countrymen against engaging in a conflict with Darius he enforced his arguments by pointing out the vast extent of the Persian Empire upon a map of the "entire circuit of the world," which had been engraved upon a brazen tablet. (Fig. 3, p. 8.)

For the first maps with degree lines marked upon them we are probably indebted to Dicæarch of Messena (350–290 B.C.), who introduced the parallel of Rhodes as a diaphragm, or separator, between the northern and southern habitable worlds. But it was only after Eratosthenes (296–196 B.C.) had approximately determined the size of the Earth, and Hipparchus (190–120 B.C.) had taught map makers to lay down places according to their observed latitude and longitude, that scientific cartography can be said to have come into existence. Thales (600 B.C.) had already invented the gnomonic projection, Hipparchus introduced the stereographic and orthographic projections, but map makers like Marinus, the great predecessor of Ptolemy, seem to have been contented with producing plane charts, the meridian differences of which were correct only along the parallel of Rhodes, until Ptolemy (140 A.D.) published his famous map of the world on a conical projection. (Fig. 5, p. 9.) The principles laid down by Ptolemy for the compilation of maps apply in our time as they did in his, and to their development and the improvements of instruments and methods of observation modern maps are indebted for their comparative accuracy and scientific value.

The most valuable contribution of the Middle Ages to the progress of cartography consists of the so-called "Compass charts," specially designed for the use of mariners, and based solely upon compass bearings and an estimate of distances, without reference to any latitudes that may have been available from actual observation. The coast lines on these charts are given with remarkable fidelity.

Scale of Maps.—The *scale* of a map, or the proportion which it lineally bears to the actual size of the region represented, is expressed either in the form of a fraction whose numerator is 1, or by reference to some well-known unit of length. The former is the method more usually followed, and more to be recommended, as it is independent of the various measures of length in use among different nations. Thus, when it is stated that the scale of a map is 1–100,000th of nature, or 1 : 100,000, we know that every lineal unit on the map represents 100,000 such units in nature. Or it is stated that every inch, as measured on the map, represents one or more miles in nature. Thus, a scale of 1 statute mile to the inch (which is that of the British Ordnance Survey general map) is the same as a scale of 1 : 63,360, for 63,360 inches are equal to one statute mile.

Measurement of Distances on Maps.—The scale to be found on nearly all maps is that of the equator or of the central meridian, and hence it follows that this scale can be used for measuring distances only when the area embraced within the map is small. In the case of maps of extensive regions or of continents, owing to the distortion or exaggeration inherent in all projections, its application would yield misleading results, quite apart from errors resulting from an expansion or shrinking of the paper in the process of printing. In proof of this we may refer to a hemisphere laid down upon Lambert's equivalent projection, whose scale, as measured along the central meridian or equator, we suppose to be 1 : 125,000,000. The scale of the same map, as determined by the meridian encircling it, is 1 : 80,000,000, whilst a "mean" scale, equal to the square root of the proportion which the area of the map bears to the actual area on the globe, would be 1 : 112,000,000. The only exception from this rule occurs in the case of maps on an equidistant projection, but even in their case approximately correct distances can only be obtained when measuring from the centre towards the circumference.

In those few cases in which the distance to be measured follows the equator or a meridian, we may determine the interval in degrees and minutes, and thus obtain an approximate result in geographical miles, of which sixty are equal to one degree of the equator. The result would, of course, be only an approximation, except under the equator, where 1 minute=1 geographical mile[1] = 6,080·27 feet. The degrees, as measured along a meridian, vary in length from 59·594 to 60·204 geographical miles. As a rule, the distance desired should be measured on a globe of suitable dimensions, or calculated from trigonometrical formula to be found in every mathematical text-book. Where a globe is available, a scale should be drawn on a slip of paper, the edge of which is to be applied to the places the distance between which it is proposed to measure.

The length of coast lines or of river courses should be measured on a

[1] The geographical or sea-mile, 60 to 1 degree of longitude on the equator, must not be confused with the British or Statute mile (used in this book when miles are mentioned without qualification) 69·2 to 1 degree or 5,280 feet in length.

globe, or, at all events, on a map of large scale. Errors due to the projection may be in a large measure eliminated by treating each trapezoid, bounded by parallels or meridians, as a distinct map, the precise scale of which will, of course, have to be determined before the measurement is made. In the operation itself a "space-runner," such as can be obtained from any mathematical instrument maker, may prove of service.

Measurement of Areas on Maps.—The measurement of areas is most readily effected when the map is on an equivalent projection. If a plate of glass have engraved upon it small squares the relation of which to the area of the map is known, the area is obtained by placing the glass over the map and counting the squares required to cover the country whose area it is desired to ascertain. Or the area may be calculated directly with the aid of a Bar or Polar Planimeter. Another way is to

FIG. 14.—*Picture Map of Part of London, showing Blackfriars Bridge, St. Paul's Cathedral, Southwark Bridge, London Bridge, the Tower, and the Tower Bridge.*

take the areas of all full quadrilaterals from a table of the areas of quadrilaterals of the Earth's surface, such as is to be found in the "Geographical Tables," published by the Smithsonian Institution, and add to the result the areas of outlying portions of quadrilaterals.

Plans.—It is obvious that the detail which it is possible to introduce into a map depends more especially upon the scale to which it is drawn. Accordingly we distinguish between plans, topographical maps, and general maps. The scale of a *Plan* should be sufficiently large to enable separate houses and plots of land to be clearly distinguished. A scale of 1 : 500 would suffice for this purpose, and occasionally even a much smaller scale, say 1 : 10,000. As a plan only embraces a very small area the sphericity of the Earth's surface is not taken into account by the surveyor, the principles of plane trigonometry alone are involved, and the only instruments really needed are a chain, a cross-staff, and (when altitudes or sections are required) a level.

Topographical Maps.—*Topographical Maps* must be on a scale sufficiently large to enable the draughtsman to show plans of towns and villages, roads, and other features, without excessive exaggeration. No map on a smaller scale than 1 : 200,000 will enable this to be done. The details for such a map may be taken from available parish maps on a larger scale, from plane-table surveys, and even from rougher compass surveys. In combining these materials, in the case of a country of considerable extent, account has to be taken of the sphericity of the Earth, the position of at least one point has to be fixed by careful astronomical observation, the length of a degree has to be measured, and the country covered with a network of triangles starting from a base-line and checked in the course of the triangulation by one or more bases of verification. The first map produced on such scientific principles was that of France by

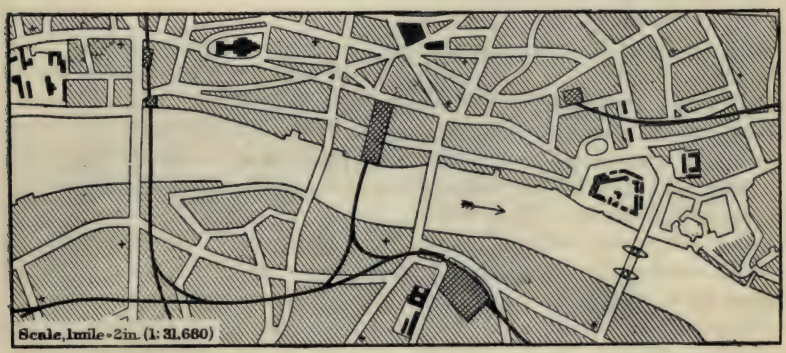

FIG. 15.—*Topographical Map of the Part of London shown in Fig.* 14.

Cassini de Thury, the first sheet of which, on a scale of 1 : 86,400, was published in 1750, and the last in 1793.

In England several counties had been triangulated about the same time, but a regular trigonometrical survey was only begun in 1784, when General Roy measured a base-line on Hounslow Heath. This survey was subsequently extended to the whole of the United Kingdom. In spite of the slow progress of the work of the survey, and some details which are open to criticism, it may be safely asserted that no country of so great an area possesses a map which can compare in accuracy with that produced by the "Ordnance Survey" Office. The surveyors have supplied the contoured lines of elevation from careful measurements, and not from mere estimates or barometrical observations, as is still the case with most official maps in other countries. The survey has produced town plans (1 : 500 or 1 : 2,500), parish maps (1 : 2,500), county maps (1 : 10,560 or 6 inches to the mile), and a general map (1 : 63,360 or 1 inch to the mile), as well as maps on the smaller scales of 2, 4 and 10 miles to an inch (1 : 126,720,

1:253,440, and 1:633,600). The beautiful but tedious process of engraving on copper has been largely superseded by more rapid processes. The maps may be purchased at most post-offices in the United Kingdom.

Trigonometrical surveys have now been extended over the whole of Europe, except northern Russia and portions of the Balkan Peninsula. The maps are published on various scales: 1:100,000 in the case of Germany, Scandinavia, France, Italy, and Portugal; 1:75,000 in the case of Austria and Servia, &c. In addition to these general maps, the various survey departments issue plane-table sections (*planchette-minutes*, *Messtischblätter*, &c.), usually on a scale of 1:25,000. The publication of maps or plans on a still larger scale is, as a rule, left to be done by local authorities.

Trigonometrical surveys outside Europe have as yet been undertaken only in detached areas. India led the van in this useful scientific enterprise, its trigonometrical survey being very complete. Japan may claim credit for being the first Eastern State to have a scientific Survey Department. In Africa a commencement has been made by the French in Algeria and Tunis, and by the British from Cape Colony. In the United States isolated surveys were begun in 1830, but the work has been carried on systematically only since 1879, partly by the Coast and Geodetic Survey, and partly by the United States Geological Survey, which has a topographical branch. In addition, surveys of some States have been carried out by the authority of the State legislature. The maps vary in scale according to the nature of the country, the north-western States being on a scale of 1:62,500, the Rocky Mountain region on a scale of 1:250,000. The features of the ground are shown by contours. The relative degree of accuracy in the mapping of the continents is shown graphically in Fig. 6, p. 13.

General Maps.—Under general maps may be included all those on a smaller scale than topographical maps. Their production, where regular surveys are available, is a very simple matter. The original materials are reduced mechanically by the use of squares, or more directly by pantograph or photography, to the scale desired. The information which it is thought right to give in view of the object which the map is to serve must be selected with judgment. Many details have to disappear, the place of others is taken by signs or symbols, and exaggeration becomes necessary; but the draughtsman must take care to bring out those features which are most characteristic of the country delineated. This applies especially to the hills, which are too frequently merely sketched in, or omitted altogether, on account of the cost of indicating them.

Where regular surveys are not available the map has to be compiled with the help of all materials more or less trustworthy—a task involving much labour. The compiler first of all lays down those places the position of which has been determined by trustworthy astronomical observations; he then adjusts to these points the route surveys or sketches made by ex-

plorers, and finally adds information derived from native sources. The result, in many cases, hardly compensates for the labour involved in the production of such a map, yet, until quite recently it was the only means of gaining an idea of the geographical features of the greater part of Africa and of Inner Asia, and notwithstanding the progress of regular surveys, and the better work brought home by explorers, the time is still far distant when the services of the compiler can be dispensed with.

Initial Meridians.—The initial meridian now almost universally adopted, in accordance with a recommendation of an International Geodetic Congress, which met at Washington in 1884, is that of Greenwich; but other meridians are still frequently employed, especially in French maps, and in those of the national surveys of other nations. The assumed meridian of the island of Ferro, in the Canaries (Fig. 453), was once largely used on account of the convenient manner in which it divides the world into an eastern and a western hemisphere. The following is a list of observatories whose meridians have been so used:—

LONGITUDE OF OBSERVATORIES.

Longitude E. of Greenwich.	°	′	″
Sydney, N.S.W.	151	12	23
Madras	80	14	50
Bombay	72	48	55
Pulkova (St. Petersburg)	30	19	40
Helsingfors, Finland	24	57	17
Cape Town	18	28	41
Stockholm	18	3	30
Rome	12	28	40
Munich	11	36	32
Christiania	10	43	25
Brussels (Old Town)	4	22	11
Paris (Observatoire National)	2	20	15

Longitude W. of Greenwich.	°	′	″
Madrid	3	41	15
Lisbon (Naval Obs.)	9	8	23
Ferro, assumed as	17	39	45
Rio de Janeiro	43	10	21
Santiago de Chile (New Obs.)	70	41	39
Washington (Old Obs.)	77	3	1
Mexico	99	6	39

Delineation of the Ground.—In olden times, and occasionally even to the beginning of the nineteenth century, the inequalities of the ground were indicated by serrated ridges or groups of mole-hills, varying in size and number in accordance with the supposed height, extent, and character of the mountain ranges they were intended to represent. Only occasionally did a draughtsman rise above this inartistic level and give a picturesque outline to his hills, by drawing them in perspective, or attempting to portray their characteristics by washes in ink.[1]

Hatchings (*hachures*) were first introduced in the beginning of the eighteenth century. The method was fully developed in La Condamine's map of Quito, published in 1751, and popularised by Arrowsmith. In this crude system of hill shading almost everything is left to the judgment and artistic skill of the draughtsman. A scientific basis for delineating the features of the ground was first supplied by Philip Buache in 1737, when he placed before the French Academy a map of the Channel, on which the configuration of the sea-bed was indicated by contour lines, *i.e.*, lines which run

[1] Instructive examples of early attempts at hill sketching are the wonderful maps drawn by Leonardo da Vinci (1452-1519), K. Türst's "Landtafel" of Switzerland (1495), Apian's map of Bavaria (1568), and Gyger's map of the Canton of Zürich (1667).

through all points at the same level, like the line of contact of sea and land in calm weather. He suggested that this method might advantageously be extended to the delineation of the land, and this was done for the first time in 1791, when Dupain-Triel published a contoured map of France. A scientific framework or skeleton for delineating the ground had thus been furnished ; the contour lines drawn at equal intervals sufficing, if numerous

FIG. 16.—*The Guildford Gap : Contoured Map.*

enough, not only to show the actual height of the land but the form and gradient. Crowded contour-lines indicate a steep slope, contour-lines far apart a gentle slope.

Something more than contour-lines was needed to give plasticity to maps. Various methods have been introduced for effecting this purpose. By increasing the number of contours the shape of the hills can be

FIG. 17.—*The Guildford Gap : Hills shaded.*

brought out more distinctly, and this "Horizontal style" yields very satisfactory results if well done. Another method consists in covering the contours with hatchings crossing them at right angles, and thus drawn in the direction of the greatest descent. This is the "Vertical style." Lehmann (1783) proposed that the scale of shade should correspond to the degree of declivity, and that the map should be supposed to be illuminated vertically. His principles have met with very general acceptance, and it

is now admitted that only a combination of contours (preferably printed in a colour different from that of the hill shading) with hatchings, can yield a satisfactory representation of the features of the ground. There are, however, cases in which an oblique illumination may yield better results, and washes of Indian ink or tints may be substituted for the hatchings. The colour-printed Ordnance Survey maps illustrate both methods.

Another method for bringing out the vertical structure of a country in its general features, is that of tinting the intervals between the contours, thus producing a "strata map." Where the number of these "strata" is limited the same tint may be employed throughout, its depth increasing with the altitude, but where the features to be shown are more complicated it may become necessary to employ various colours, and upon their judicious selection must depend the beauty and expressiveness of the map.

The Orthography of Geographical Names.—Care should be taken that the orthography of geographical names should enable the reader of a map to pronounce them with at least approximate correctness. The rules laid down by the Council of the Royal Geographical Society should therefore be adhered to as far as possible. They are exceedingly simple. Names in countries using Roman letters are to be retained as spelt by the respective nations, as are also names in other languages which by long usage have become familiar to English readers. All other names, however, are to be spelt phonetically, as pronounced on the spot. The vowels are to be sounded as in Italian, the consonants as in English, and no redundant letters are to be introduced.[1] The diphthong *ai* is to be pronounced as in *aisle ; au* as *ow* in *how ; aw* as in *law*. *Ch* is always to be sounded as in *church ; g* is always hard ; *y* always represents a consonant ; whilst *kh* and *gh* stand for gutturals. One accent only is to be used, the acute, to denote the syllable on which stress is laid. It is obvious that in numerous instances these rules must prove altogether inadequate when attempting to express the sounds of a foreign language. The admission of additional diacritical marks such as ¯ and ˘ to express quantity, and the diæresis, as on *aï*, to express consecutive vowels, which are to be pronounced separately, would prove of service, but in all cases where greater precision is aimed at, recourse must be had to such an alphabet as that of Lepsius, or to an alphabet specially adapted to the language the sounds of which it is proposed to reproduce.

The Board of Geographic names in the United States acts upon rules practically identical with those indicated above, and compiles an official list of place names, the use of which is binding on Government departments.

Maps for Special Purposes.—These are most varied in their contents. The most ancient among them are route maps—the *Itineraria picta* of the Romans—and marine charts ; the most recent are maps illustrating the physical geography of the globe.

[1] Yet the rules say that all vowels are shortened in sound by doubling the following consonant.

Charts (from *charta*, paper) are designed for the special use of sailors, and prominence is given upon them to every feature a knowledge of which is requisite for safe navigation. They show more especially the depth of the sea, taking *low* water as a standard or datum level, and not the *mean* level of the sea, as is done in topographical maps. Charts, as a rule, are laid down on Mercator's projection, the advantages of which to a navigator are pointed out on p. 23, and sometimes on the Gnomonic projection, on which all great circles appear as straight lines.

Geological Maps date no further back than the latter part of the eighteenth century, and to the United Kingdom is due the credit of having been the first to organise a regular geological survey, in 1835. The utility of these surveys, quite apart from the scientific interest attached to them, is so apparent, that at the present time there is hardly a civilised State without its Geological Office or Department of Mines; nay, in parts of the United States and in some of the colonies geological surveys were inaugurated simultaneously with a general survey of the country.

There is no department of physical geography which it has not been attempted to illustrate cartographically, since Athanasius Kircher, in 1665, published the first physical map—one illustrating ocean currents. The surface features of the land and configuration of the ocean-bed; drainage basins; the phenomena of the atmosphere; the distribution of plants and animals; and, in short, every form of distribution over the Earth's surface is capable of being illustrated by means of maps. Maps showing roads and railways are in daily use; others illustrating the distribution of the population according to density, race, language, or religion; vital statistics, and every department of social or industrial life are being more and more appreciated. Maps have likewise proved of inestimable service to the student of history.

The ingenuity of compilers has been taxed to the utmost in efforts to present the facts of geographical distribution in an intelligible and striking manner. Density of population, for instance, is generally indicated by a graduated tint, but two or three tints might be employed, one to cover those parts of the country where the density approaches the mean, the two other tints indicating those parts where it falls short of the mean, or exceeds it. This method, greatly generalised, is shown in Fig. 18. It is obvious that the same principle is applicable in numerous other instances, or where the feature mapped is the varying degree of a certain condition.

Relief Maps.—It is claimed on behalf of maps in relief that they present a better portraiture of the inequalities of the ground than is possible in the case of plane maps. This contention, however, can only be admitted on the understanding that the heights are not exaggerated to an extent which would yield a caricature instead of a picture true to nature. A fair amount of exaggeration may be admissible in the case of relief maps on a small scale, but is altogether objectionable where the scale is

large. Relief maps of more extensive countries, moreover, should be built up on a spherical surface, or the relief loses all claim to naturalness.[1] So-called strata reliefs, built up in steps from the strata of a contoured or hypsographical map, are altogether objectionable.

Globes.—A globe is the only means of conveying a faithful idea of the distribution of land and water over the entire surface of the Earth. This advantage was early recognised, and Crates of Mallos is credited with having produced the first terrestrial globe. Globes of an early date are frequently referred to, but the oldest which have survived to our day are one by Behaim (1492), now at Nürnberg, and the so-called Laon globe, now at Paris (1493). These ancient globes are either drawn by hand or engraved on metal. Globes of this description were naturally very expensive, and Hylacomilus (Waldseemüller) has consequently deserved well of the student of geography, when, in 1507, he printed a map of the world upon gores intended to be pasted upon a globe, thus placing this most indispensable educational apparatus within the reach of all. They may now be had of all sizes and at a low price. The globe is not only an atlas on a uniform scale, without distortion, but a valuable mathematical instrument by the aid of which important calculations may be easily made.

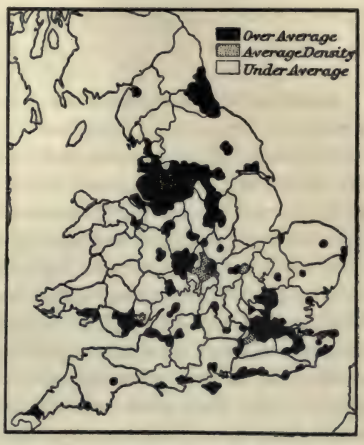

FIG. 18.—*Density of Population in England and Wales.*

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[1] This was proposed to be done by Maestlin in a letter to Kepler (1596), by Hauber (1724), and apparently first acted upon by Erben, of Stuttgart, about 1850. The oldest relief of which I have any notice is one of Antibes (1665).

CHAPTER IV.—THE PLAN OF THE EARTH

By J. W. Gregory, D.Sc., F.R.S.,

Professor of Geology in the University of Glasgow.

General Resemblances.—The vast unknown interior of the Earth is bounded by a shell composed of two layers, the solid rocky crust, or "lithosphere," and the seas and oceans, or "hydrosphere." If the Earth has solidified from a gaseous nebula, then there may have been a stage when the whole lithosphere was covered by an unbroken sheet of water. But now, as through all the ages revealed by geology, the rocks have been piled up in broad masses or high mountain chains which rise above the level of the hydrosphere, while the waters are collected into the intermediate depressions. The geographical distribution of the exposed portions of the lithosphere appears, on first inspection of a map, to be so irregular and complicated, and the continents to differ so much in topographic form that their arrangement appears haphazard and accidental. But if we ponder over a map of the world we detect a series of striking coincidences and of repetitions of the same essential forms. There is, for example, a remarkable resemblance in the general shapes of the masses of land and water. Thus, the greatest of the land areas, the Old World, consists of a vast triangle, of which the base extends from Norway to Bering Strait, with the apex at the Cape of Good Hope. The greatest of the oceans is the similar but inverted triangle of the Pacific. Again, the New World consists of two triangles, one contracting from the barren steppes of the Arctic shores to the Isthmus of Panama, and the other contracting from the triple Cordillera of Colombia and the high scarp of Venezuela to the ridge of Cape Horn. And much as the Old World corresponds to the Pacific, so the two Americas correspond to the two basins of the Atlantic, and the Arctic Sea to the Antarctic land. In the coast lines of the continents other points of correspondence reveal themselves. The Pacific coasts are steep and high, and are formed in the main by mountain ranges parallel to the shores; its Asiatic coast is hung with festoons of islands, and remains of similar island chains occur off its American coast. The Atlantic shores, on the contrary, are low and shelving, except where they pass round the margins of high plateaux or cut across mountain chains, of which the directions are rarely parallel to the shores. The islands are few and irregularly scattered instead of being hung in festoons. Moreover, both Atlantic shore lines follow the same course, as if moulded by the same influences; thus the Gulf of Guinea occurs opposite the projection of Brazil; the Mediterranean offset on the east

corresponds to the Caribbean on the west; the eastward recession of Europe is followed by the eastward advance of America.

Geomorphological Theories.—Such resemblances have been repeatedly pointed out by geographers. For example, most elementary textbooks remark the southward tendency of peninsulas. It has, therefore, long been a favourite idea of geographers that the main outlines of the continents are not accidental, but have been determined by some undiscovered principle or law. A quartz crystal, with its massive form, its simple outline, its flat faces, and straight edges, appears to have no point in common with a snowflake composed of a radial cluster of delicate, feathery tufts. But the crystallographer recognises that the two different forms belong to the same crystalline system, have the same hexagonal symmetry, and are built on the same fundamental plan. Similarly geographers have believed that veiled by the great variety in topographical details there is some underlying symmetry in continental form, the discovery of which is the main problem of geomorphology. The mediæval wheel maps may be regarded as early attempts to express geomorphological theories, which rested on a theological basis. But it was not until the nineteenth century that any satisfactory beginning was made. In 1684 Burnet, in his "Theory of the Earth," had called mountain chains "the backbones of the continents"; and that idea has so long been popular that the effort to discover the principle governing the evolution of the continents naturally began with the study of the origin of mountain chains. The first formal theory of geomorphology, that enunciated by Elie de Beaumont in 1852, was based on the hypothesis that mountain chains having the same orientation were formed at the same date by the same causes. If, therefore, the age of a certain mountain chain be required, all that is necessary, according to Elie de Beaumont's system, is to determine its orientation and compare it with a standard scale in which the directions of a considerable series of mountain chains are marked. This system failed as it was too ambitious. The effort to state a theory with mathematical precision, and to make it of universal application, led to exaggeration of the truth on which it rested. The theory was soon found to be inconsistent with essential facts and was discredited. But Elie de Beaumont's effort to correlate Earth-movements over extensive tracts of the Earth's surface was not in itself chimerical. Geological, physical, and astronomical considerations all support belief in a certain connection between some distant mountain chains. Thus among the mountains of Europe and western Asia, which trend east and west, the two that agree most closely in orientation are the Pyrenees and the Caucasus; and as Prof. Bonney has shown, they agree most closely in geological structure, and were probably elevated at the same date. Lowthian Green has proposed a physical explanation of the triangular form of the land masses, and why the triangles should be disposed as they are. And Sir George Darwin has suggested an astronomical cause of the phenomena, by pointing out some coincidence between the

distribution of land and water with lines of strain in the Earth's crust caused by some early incidents in its history.

Relative Permanence of Continent and Ocean.—Nevertheless, after the overthrow of Elie de Beaumont's system, the interest in geomorphology was lessened by the influence of Lyell's teaching ; for his axiom of the continual interchange of land and sea, owing to the alternate elevation and depression of the land by local independent agencies, threw doubt on the existence of any one steady general cause. Lyell's theory received its first severe check from the diametrically opposite view of the permanence of the continents and ocean basins. In the oceanic abysses various oozes are now being deposited. Nothing exactly like these oozes is met with among the rocks forming the continental masses, except for a few patches on the rims of the ocean basins. The sediments which form the continents resemble those which are being deposited in shallow seas, in lakes and rivers, or on land. "The vast grey level plains of ooze where the shell-burr'd cables creep" of the existing ocean floors, have apparently never been raised above sea-level. This fact has been cited as conclusive proof of the permanence of the ocean basins ; but if we neglect deductive negative evidence and study the actual history of different parts of the Earth, we find that the conceptions of continuous oscillation and of prolonged immutability are both true in part. Some land areas have been permanent from a very early period of geological history ; others have been subject to alternate movements of elevation and depression, accompanied by the contortion and crumpling of the beds. Thus, on the one hand, the great block of Scandinavia, Lapland, and Finland, the central highlands of Brazil, the plateau of Labrador, the peninsular area of India, the meseta or central plateau of Spain, are each composed of extremely ancient rocks ; their margins have been repeatedly washed by the sea, but they themselves have never been below sea-level. On the other hand, the British Isles, Portugal, the Atlantic States of America, Japan, and northern India have been repeatedly submerged beneath the sea. The test of actual inspection cannot be applied to the ocean floors, but the submarine parts of the lithosphere are probably subject to the same movements as the areas now above sea-level. Strong support to this view is given by palæontology, one aspect of which becomes meaningless, if we believe that the land masses have always been separated by the existing ocean barriers. Hence it is now widely thought that the view that every part of the ocean floor now below the depth of a thousand fathoms has always been below sea-level, is as exaggerated as the old Lyellian doctrine. But it was a most useful protest, for with the limitation of Lyellism, geomorphology advanced again. In a brilliant address to the British Association in 1892, Professor Lapworth described the continents as arches formed by vast Earth-folds, while the ocean basins are the sunken troughs between the raised continental arches. Lapworth's fold theory has not, however, yet been stated at length, and Suess's great work on the face of the Earth ("Das Antlitz der Erde")

remains the only modern attempt to describe the physical geography of the world in accordance with a definite system of geomorphology.

To understand Suess's views, we must comprehend the nature of the movements which affect the level of the Earth's crust. According to the Lyellian school the Earth is undergoing continual oscillation, areas sinking or rising either as wide, continental masses, or by the contortion of belts into mountain chains. This interchange was attributed to variations in the height of the land and not to changes in the level of the sea. Thus in northern Scandinavia the sea has been receding, while in the southern part of that country it has been encroaching on the land. According to Lyell this was because the ground was rising in the north and sinking in the south. Round the British coasts there are raised beaches in some places, and submerged forests in others, facts which were similarly explained by the assumption of differential movements in the land. But the phenomena can be equally well explained by variations in the level of the sea. The sea-level is not a fixed, definite level. The old maxim that "water will find its own level" may be true within the narrow range of a set of water-pipes, but the water of the sea knows no level. Water in a glass is raised around the margin owing to the capillary attraction of the sides. In the ocean basins the waters are heaped up against the continents by the gravitational attraction of the land, and they are thus depressed in the middle. In the case of land-locked seas the theoretical water-level is disturbed by the action of winds and currents, just as the water in a lock is heaped up against the sides when a strong current flows into it. Again, the amount of water on the Earth is limited, so that if the depth of the oceans increases their area must lessen. Taking the mean depth of the Pacific Ocean at 13,000 feet, if its floor were to sink until the mean depth is 1,000 feet greater, then the sea-level throughout the globe would be nearly 500 feet lower; the land would appear to have risen to that extent without the slightest actual movement of its own.

Suess's Theory of Changes in Sea-level.—Such variations in sea-level are not only possible but probable, and there is some strong geological evidence of their occurrence. On the western shore of Calabria there are some old beach lines which rest in one place on the face of a cliff of Miocene limestone, in another traverse a spur of the Appennines, elsewhere lie on the Archæan schists of the Peloritani, and on the recent volcanic tuffs of Etna. The old beach lines, however, maintain their horizontality throughout. Western Scotland furnishes a similar illustration, for a sea beach there, at the height of 100 feet above the sea, lies on rocks of different ages and hardness, and it crosses undisturbed great faults and dislocations. Suess holds that it is physically impossible for such complex areas and rock masses to be upraised without any relative displacement of the different parts. Hence he argues that where we find broad tracts of raised marine deposits maintaining their original horizontality, we must attribute their position to movements of the hydrosphere instead of to those

of the lithosphere. This contention is essential to Suess's theory of geomorphology. The subsidence of wide areas and the elevation of narrow bands can both be explained by the radial contraction of the globe. But that agency will not account for the undisturbed elevation of extensive areas. If such elevations do occur, then there must be some other factor at work, and we cannot hope for any complete theory of geomorphology until the nature of this unknown cause be discovered. But if there be no such movements then we know already an adequate cause for all the movements in the Earth's crust.

Suess's theory, then, is simply that the movements of the lithosphere may be divided into two groups—(1) The *subsidence* of wide areas where, owing to the contraction of the Earth's interior, the crust is left without support; (2) the *folding* and contortion of rocks along certain lines whereby the rigid crust is able to contract into a smaller space. Between the fold-lines, and beside the sunken lands, crust-blocks stand up like the piers of a bridge of which the arch has fallen in. Suess's great contribution to geomorphology is, that he has shown that the existing structure of the world can be explained by these two sets of movements. Each of the continents consists of lines of fold-mountains, or blocks of strata which have been left standing above the level of the ocean basins formed by subsidence.

FIG. 19.—*The Lines of Tertiary Fold-Mountains.*

The Structure of America.—The two Americas show this arrangement most typically. Both of them are bounded to the west by a long mountain chain; both of them have an eastern border of fold-mountains, such as the Alleghanies and the Sierra do Paranão. The north-eastern corner of each is formed of a block of Archæan rocks, neither of which has apparently sunk below sea-level since the earliest days of geological history. In both continents a vast basin occurs between the bounding lines of fold-mountains. And the geological history of the two Americas has been aptly summarised as the history of the gradual filling up of two great gulfs which occurred between the eastern and western ridges.

The Structure of the Old World.—The structure of the Old World is less simple, for the land is broader and more complex. Its main fold-line runs from east to west instead of from north to south. It is usual to associate Europe and Asia as the continent of Eurasia, to which the part of Africa north of the Sahara is added on biological grounds. But from the standpoint of geomorphology we cannot separate central and southern Africa, unless we also exclude the peninsular area of India. The

great land mass of the Old World is divided into two by a belt of fold-mountains which runs from the Atlantic to the Pacific. The southern margin of this belt follows the Atlas Mountains, crosses Tunisia, and passes north of Malta and south of the Greek Archipelago; it continues east along the Taurus, bends northward beside the Persian Gulf, and continues its former direction past Baluchistan and the northern foot-hills of the Himalaya; then it runs south again across Burma and the Malay Peninsula, and turning eastward once more crosses the Malay Archipelago, until it sinks below the Pacific. This line divides two regions which have quite different geological structures. South of it is a series of table-lands of great geological stability and antiquity. North of it is a vast tract in which the rocks are mostly horizontal or gently inclined, and only violently contorted along the lines of the great mountain chains, the directions of which are moulded by blocks of old rocks, such as the Central Plateau of France, the Alpine Foreland in South Germany, and the *massif* of Bohemia. A series of subsidences along the southern margin of the northern division has formed the basin of the Mediterranean, the Black Sea, the Persian Gulf, and the Indo-Gangetic plain; and this series appears to be a direct continuation of the Caribbean depression which separates North and South America.

The Origin of the Oceans.—So far for the structure of the continents. Their shapes are necessarily determined by the surrounding oceans, concerning the history of which direct geological evidence is scanty. Occasional islands tell us a little, and a little more may be inferred from the trend of the rocks and mountains on the continental margins, and from the arrangement of the suboceanic ridges. The subject is speculative and controversial; but it seems to be generally agreed—by geologists at least—that the ocean basins have been formed by subsidences at different ages. Thus the *Atlantic Ocean* may date from middle Cainozoic times. According to Suess the Atlantic Ocean results from the gradual enlargement of two gulfs which projected north and south from the old Mediterranean Sea that extended from Central America to the Levant. The Arctic Sea may have been formed at the same period. The *Indian Ocean* is probably older. It appears to have originated by the subsidence of the section of Gondwanaland that united India and Africa, of which the Archæan rocks of the Seychelles and Mauritius are remnants. The *Pacific Ocean* may have undergone great changes later than the other oceans. It has certainly encroached upon Australia by the subsidence of the submerged portion of the Melanesian platform, which extended northward and eastward from Australia as far as New Guinea, New Caledonia, Lord Howe Island, and probably New Zealand. Beyond this crescentic line of continental islands are the oceanic islets of Micronesia and Polynesia, which range through more than 100° of longtitude. According to Darwin's theory of coral islands these chains mark the site of a sunken land. The Patagonian platform projects from South America to meet the southern island chain, and some indications

of a former land connection along this line are given by the evidence of zoological distribution. In the North Pacific the evidence is more scanty. The island festoons off the coasts of Asia and America, and the transverse ridges that run east and west across Central America indicate a former seaward extension of the land. But, unless the series of islands from Hawaii to the Tonga group represents a line of movement, all the evidence in the north central Pacific has been lost.

The Test of a Geomorphological Theory.—This rapid survey indicates the nature of the evidence, which shows that the structure of both the oceans and continents is consistent with the hypothesis that their distribution has been determined by the subsidence of some regions in consequence of the withdrawal of underground support, and by the elevation of certain lines by the compression of the hard crust into a smaller space. Both movements would result from the radial contraction of the globe during cooling, but unless this cause will also explain the distribution of these two types of Earth-movements, it will not give us an adequate theory of geomorphology

The three fundamental facts of distribution which any theory must explain are the *antipodal position* of the continents and oceans, their *triangular shape*, and the *excess of water* in the southern hemisphere. Elie de Beaumont's theory gave no answer to any of these questions ; but it led to another geometrical theory which does. Elie de Beaumont attached too much importance to linear symmetry. He assumed that the Earth is a spheroid built up on a rhombic dodecahedron, which is a symmetrical body enclosed by twenty-four equal pentagons. Every face of a rhombic dodecahedron is opposite to a similar parallel face. Antipodal areas are similar. But on the Earth antipodal areas are dissimilar, for a land area at one end of an axis is always balanced by an oceanic area at the other end of the axis. In fact, in crystallographic language, the lithosphere may be described as hemihedral, not holohedral. Moreover, if we could cover two-thirds of the rhombic dodecahedron with a fluid held on to it by attraction from the centre of the body, just as the waters of the ocean are held on to the Earth by gravity, there is no reason why an excess of the fluid should collect on one half.

The Tetrahedral Theory of the Earth.—Lowthian Green proposed what is known as the "tetrahedral theory," which regards the globe as based on a form which satisfies the requirements of the case better than a dodecahedron. The body which encloses the greatest volume for a given surface is the sphere. The regular body which contains the smallest volume for a given surface is the tetrahedron, which is enclosed by four equal equilateral triangles. Hence every hard-shelled sphere which is diminishing in size owing to internal contraction, is constantly tending to become tetrahedral in form. In the case of the Earth various circumstances such as its rotation, and the attraction of the moon, render such a form impossible. But if we replace the flat faces of the tetrahedron by convex

faces, we get a body which approximates to a spheroid ; and by varying the curvature of the faces this puffed out tetrahedron may pass into the condition of a spheroid and then become truly spherical. Conversely, if a hollow sphere composed of an elastic shell be gradually exhausted of air, the external pressure will force in the four faces and gradually make it tetrahedral. The tetrahedral theory regards the world not as an angular tetrahedron, but as a spheroid which has been subjected to this tetrahedral flattening to an extent inappreciable by direct measurements, but indirectly recognisable owing to its influence on the distribution of land and water. As the flattened faces are nearer the Earth's centre of gravity, the water will collect upon them. The ratio of the areas of land to that of water on the globe is as 2 to 5. If on a model of a tetrahedron we colour the five-sevenths of the surface that is nearest the centre, the coloured area will indicate where the water would accumulate on a stationary tetrahedron. Mount the tetrahedron with one of the four points pointing downward, when one face will be horizontal at the top ; on that upper face there will be a central coloured area in the position of the Arctic Sea. It will be surrounded by a land belt, from which three projections will run southward down the vertical edges from the three upper angles. These southward land areas will each taper gradually to a point, beyond which there will be a continuous belt of water surrounding a south polar land. That is to say, that on the model the general plan of the arrangement of land and water is identical with its actual distribution on the globe ; for the geographical units are subtriangular with the land triangles pointing to the south ; land and water are antipodal ; and there is a great excess of water in the southern, and of land in the northern hemispheres.

FIG. 20.—*Tetrahedron.*

FIG. 21.—*Tetrahedron with curved faces.*

The agreement between the facts of geography and the tetrahedral theory goes further. The four faces of a tetrahedron meet along six edges, and if the Earth be subject to tetrahedral strain, these six edges should be represented on the Earth by lines of weakness. The lines of weakness would be marked by lines of crumpling, *i.e.*, by ranges of fold-mountains. The question therefore rises, does the main fold-mountain system of the world bear any relation to the traces of a set of tetrahedral edges ?

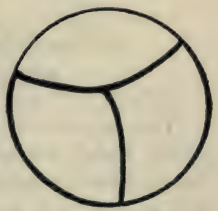

FIG. 22.—*The edges of the tetrahedral Earth.*

Terrestrial Symmetry.—If an observer were to look down on the Earth from the direction of the Pole Star, he would discern a central sea surrounded by a ring of land, broken only by the shallow Faroe Channel, Smith South, and Bering Strait. The northern face of the world consists of a

cone of land of which the apex has fallen in ; if this northern land-cap were to sink still further, its margin would be thrust out in all directions. Now Suess has shown that the whole continent of Eurasia, as geologically defined is bounded to the south by a chain of fold-mountains formed by lateral thrusts from the north. In Eurasia the predominant mountain chains run east and west, parallel in fact to the edges that bound the upper face of the tetrahedron. South of Eurasia the predominant mountain chains, rock-foliation and strikes run north and south, parallel again to the tetrahedral edges that run vertically from the tetrahedral "equator" to its south pole, hence there is a general agreement between the position of the fold-mountains and the lines of tetrahedral strain.

FIG. 23.—*Symmetry of the land round the North Pole.*

The agreement, however, is not absolute. For example, one of the points which, according to Green, should be a land centre, falls in the Pacific near the Ladrone Islands. But if Darwin's theory of coral islands be true, then that area was once continental, and has only become oceanic by subsidence in Cainozoic times. Again, Africa lies so well along one of the three vertical edges of the tetrahedron, that South America might be expected to occur on the next similar edge to the west ; but South America actually is 20° too far to the east. Green remarked the discrepancy, and explained it by invoking an eastward torsion of the southern hemisphere, due to its tendency to increase its rate of revolution owing to its decrease in diameter.

But the geological evidence suggests another explanation. The western coast of Patagonia is formed by a belt of Archæan rocks, which disappear eastward under the Cainozoic sediments, the islands of Chilean Patagonia also consist of Archæan rocks, which may extend westward as the basis of the great submarine Patagonian platform. And just as the Indian peninsula is regarded as the remnant of a continent of which the western part has been lost by subsidence, so the Patagonian peninsula may be regarded as the eastern remnant of a sunken land, the position of which would agree with the theoretical scheme.

But we have no right to expect in our old and wrinkled world that the lands should be arranged with geometrical regularity. The lithosphere varies in composition; certain regions consolidated at a very early period into great impassive blocks, which have forced the later foldings to diverge from the course they might have followed in a homogeneous crust. Further, there is nothing in the tetrahedral theory inconsistent with some variation in the position of the tetrahedral axes; hence, during the gradual shrinkage of the globe, there may have been considerable variation in the position of the lines of strain. "The physiognomy of the globe," says Lapworth, "is an unerring index of the solid personality beneath." The present physiognomy, however, is not an index of the full life history of the continents. The features of past ages must be inferred from the physiognomical fragments of the ages that remain to us. We cannot infer from the existing distribution of land and sea how that distribution has been produced. The problem is so complex and the facts so uncertain, that the historical method of inquiry is safer than the deductive method. A knowledge of the distribution of land and sea at various epochs in the world's history appears to be the only sure basis on which to rest a system of geomorphology.

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CHAPTER V.—LAND FORMS: THEIR NATURE AND ORIGIN

By Hugh Robert Mill, D.Sc.

Vertical Relief of the Earth's Crust.—Although, as has been explained in the description of the plan of the Earth, which dealt with the grand features of the crust, the geoid, or form of the actual surface of the ocean, is distorted from the true figure of the Earth, it is yet the only practical zero-surface from which heights and depths on the Earth's surface can be measured. Until the amount of the distortion of sea-level at different places is found, it is impossible to compare exactly the heights of distant continents or the depths of different parts of the oceans. The uncertainty probably amounts to some hundred feet in the most careful measurements. A comparatively small number of points of the ocean bed have as yet had their depth below actual sea-level ascertained, and only a few of the civilised countries have had the configuration of their whole surface determined by levelling. The large relations of vertical relief can therefore only be roughly estimated by making certain assumptions as to the unmeasured and unexplored regions. Such calculations have been made by several physical geographers, the latest and most elaborate being those of Professor Wagner of Göttingen. According to his results the mean level of the solid sphere is 7,500 feet below actual sea-level; but since his calculations were made the discovery of the great depth of the Arctic Sea and some very deep soundings in the Pacific and Southern Oceans show that the dividing line between the elevated and depressed regions of the crust must be drawn at a lower level, although probably not so deep as 10,000 feet, the depth which I estimated from Sir John Murray's earlier work. In Professor Wagner's hypsographic curve here reproduced in a simplified form (Fig. 24), the results of his calculations are shown graphically. The vertical lines in the diagram represent areas of the Earth's surface in percentages, the horizontal lines show depths beneath and heights above sea-level in feet, and the curve thus gives at a glance the extent of the surface lying between any limits of vertical distance.

Divisions of the Earth's Crust.—Sir John Murray distinguished three areas of the lithosphere—(1) the *Abysmal Area*, a vast and relatively uniform depression covering nearly half the surface of the Earth, mainly in the southern hemisphere; (2) a *Transitional Area* occupying less than a quarter of the surface and sloping up to (3) the *Continental Area*, which

extends over rather more than a quarter of the surface, mainly in the northern hemisphere. Professor Wagner, however, distinguishes the five divisions shown in the diagram—(1) the *Depressed Area* occupying 3 per cent. of the Earth's surface and comprising all the oceanic depths from the greatest (the deepest spot known in the ocean is 31,610 feet or 5,269 fathoms) to 16,400 feet or 2,733 fathoms below sea-level; (2) the *Oceanic Plateau*, the vast undulating expanse from the depth of 16,400 feet up to 7,500 feet, the mean level of the surface of the lithosphere, and covering 54 per cent. of the surface of the Earth; (3) the *Continental Slope* reaching thence to the edge of the Continental Shelf, or 660 feet below actual sea-level, and occupying 9 per cent. of the surface; (4) the *Continental Plateau* from the edge of the Continental Shelf to an altitude of 3,300 feet, or 28 per cent. of the surface; and (5) the *Culminating Area* comprising the 6 per cent. of surface above 3,300 feet. The Oceanic Plateau, although more gentle in the outline of its forms than the other divisions of the lithosphere, is by no means featureless. There are many broad rises which subdivide the oceanic depths without approaching the surface,

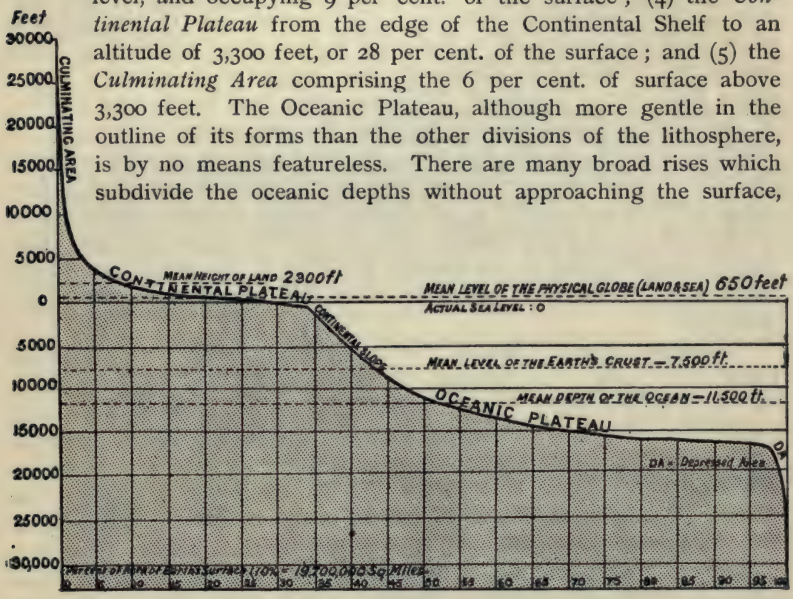

FIG. 24.—*The Hypsographic Curve. Adapted from that of Professor Hermann Wagner.*

but frequently forming the foundations whence more abrupt eminences tower upwards into islands; and in some places these abrupt heights rise even from the deeper parts of the ocean bed.

The Continental Plateau may be conveniently subdivided into the Continental Shelf, Depressed Lands, Lowlands, Uplands and Highlands which merge in the Culminating Area. The *Continental Shelf* slopes very gently from the coast down to about 100 fathoms or 200 metres (600 or 660 feet). In some places, such as the west coast of South America

or of Africa, it is only a few miles wide; but in others, *e.g.*, off north-western Europe and south-eastern South America, it stretches for several hundred miles from land. It unites all the large continental islands to their nearest continent, with the exception of Madagascar, New Zealand, and Celebes. Sailors speak of this zone of shallow sea as "in soundings," because it is always possible to use a hand-lead for finding depths less than 100 fathoms; and its boundary is a matter of importance, since a vessel "out of soundings" is usually free from the risk of running on shore. *Depressed Lands*, which lie below sea-level, are of very small extent, occurring only in the Dead Sea rift-valley, the subsiding delta of Holland, and some dried lake beds in the deserts of Asia, Africa, and North America. The contour line of 660 feet (200 metres), which corresponds to the mean surface of the actual globe (lithosphere and hydrosphere combined), may appropriately be taken as the upper limit of the *Lowlands*. It is interesting that the present position of sea-level is almost midway between the outer edge of the shallow Continental Shelf, say 600 feet below sea-level, and the inner edge of the lowlands, say 600 feet above sea-level, a total area of 22,000,000 square miles, and the flattest part of the Earth's surface of equal extent except the floor of the Oceanic Plateau. For *Uplands* the upper limit 2,000 feet, nearly corresponding to the average elevation of the whole land of the globe, may be assigned; while all above that elevation may be called *Highlands*.

Classification of Land Forms.—The grandest contrast in the relief of the crust is that between the vast sunk plains of the ocean floors and the elevated surface of the continental world-ridges. The primary practical division is, of course, that into land and water; with subdivisions into oceans, seas, incurves, gulfs, and lakes for the water; and for the land on strictly similar lines into continents, outcurves, peninsulas, and islands. The land may indeed be viewed as entirely composed of islands, for every continent is either an island or part of one; but the distinction between continent and island or peninsula, though one of rank only, is convenient because continents possess a distinctive individuality not shared by smaller islands, and there is no more risk of confusion of ideas than is involved by the classification of the strength of a regiment into officers and men.

From the geographical point of view land-forms are best considered, in their larger aspects at least, from the point of view of form alone without reference to their geological history. No definite system of classification has yet been generally adopted; but the need of arriving at a common understanding on the subject is recognised by the geographers of all nations, and tentative schemes have been put forward by Professor Penck and others. The following attempt to describe some of the more important kinds of land-forms is neither complete nor altogether consistent; but it may help the student to understand the descriptions of

countries in Part II. It may also form a basis for criticism and fuller discussion.

The simplest form-elements are the plain, hollow, cliff, mountain, hill, and valley. The *Plain* is a nearly level or gently sloping expanse, which may be a sunk plain if depressed below sea-level, a low plain if on the lowlands, an upland plain in the uplands, or a high plain if it occurs in the highlands. A *plateau* or *tableland* is strictly an upland or high plain which is bounded on all sides by a more or less abrupt descent to lower ground, or perhaps bordered in part by mountain ranges which are low in comparison with its breadth. An extensive plateau may be crossed by mountain ranges or deep valleys; but a highland composed of mountains and valleys alone has no right to the name of plateau. The Pamirs, for example, do not form a tableland, but only a lofty and diversified highland for which a specific name might well be devised.

The *Hollow* is a land-form which is bounded entirely, or nearly so, by higher land. When its floor is flat it is often called a hill-girdled plain; when more typically it slopes towards the centre it is appropriately termed a basin, or if amongst mountains an intermont basin. If the word basin were not also loosely used for the whole drainage area of a river system it might be adopted for this land-form alone, and it is used in this sense by many authors. Perfect hollows of dry land can only occur in arid regions, where they frequently contain salt-lakes or beds of salt. In moist climates they are necessarily occupied by lakes, although incomplete hollows are usually drained by a river.

The *Cliff* or *Scarp* is a belt of extremely steep slope, usually marking the edge of the sea, one bank of a river or the sides of a gorge. A scarp may break the continuity of a plain, separating one nearly level expanse from another at a higher level. The term *escarpment* is applied to the relatively steep slope which follows the line of strike of the strata.

Mountains and *Hills* are to be distinguished by height alone, yet no definition of a hill has ever been more satisfactory than "an elevation lower than a mountain," while a mountain can only be termed "an elevation higher than a hill." It may, however, be conceded that mountains are confined to the highlands over 2,000 feet in elevation, while hills may occur also in lowlands or uplands. Mere elevation of a summit above sea-level is not enough to constitute a mountain; an eminence rising 300 feet above one of the vast level plains of Tibet can only be called a hill, although its summit may exceed 16,000 feet above the sea. A mountain system like the Alps or Andes, although forming a broad region, is easily recognised as consisting of mountain ranges. German geographers distinguish between low, middle, and high mountains, but the English language renders such a division cumbrous in use. Peaks are usually the culminating points on the crest of a mountain range, but occasionally, especially in the case of volcanoes, a great summit may rise directly from a plain. Parallel mountain ranges often enclose between them intermont basins of

considerable extent and at a high elevation, or even, as in the case of Tibet, extensive tablelands.

The *Valley* is perhaps the most varied of all land-forms. A valley may be viewed as limited by the meeting lines of slopes.[1] The meeting line of two diverging slopes is a *watershed* or water-parting or divide, and such a line marks off the valley of a river, viewed in its largest sense, from those of its neighbours. The valley, in a narrower sense, may be marked by the lines separating gentle from more abrupt slopes. The meeting place of two converging slopes is a *Thalweg*, valley-line, or stream-line, usually marking the central line of a river bed. The walls or sides of a valley may be abrupt as in a gorge or gently inclined like the imperceptible slopes bordering a great river before the commencement of its flood-plain. The whole space between the outer watersheds limiting the region draining into a single river is called the *drainage-area* of that river. Transverse valleys, better termed defiles, completely traverse a mass of high ground from the plain on one side to the plain on the other. The name of *longitudinal valleys* is given to the long hollows between two parallel mountain ranges; while the shorter valleys which furrow the sides of the mountains are called *lateral*. Two lateral valleys meeting on the crest of a range form a *col* or pass by which the range may be crossed. No geographical features are more important in determining the lines of traffic across mountainous regions than transverse and lateral valleys with their connecting passes. The head of a valley on a mountain side may take the form of a rounded recess amongst the rocks termed a *corry* or *cirque*, the cliffs surrounding which often rise extremely steeply. The lower ends of river valleys on the coast when "drowned" or submerged, form inlets of the sea of various kinds. In this way lowland valleys give rise to estuaries, firths, or bays; upland or highland valleys form inlets which are known as *rias* when the depth diminishes gradually from the mouth towards the head, and as *fjords* or sea-lochs, when a bar shallows the water at the mouth, thereby separating a considerable depth inside from the deep water outside.

In this rapid summary of the chief form-elements of the land reference has been made to their form only; but while it is the form that mainly controls the distribution of climate, vegetation, animal life and human activity on the Earth's surface, the origin of the various forms has important bearings, and often allows a more helpful method of classification to be adopted.

Materials of the Earth's Crust.—The study of the material composing the lithosphere and the changes it has undergone in the past is the special subject of the science of geology; and while we do not concern ourselves here with the methods or controversies of geologists,

[1] It might perhaps be permissible to include the *slope* as a distinct land-form, but where a gentle slope is found it may be viewed as an inclined plain; and a steep slope forms part of either a mountain, hill, scarp, or valley.

GEOLOGICAL FORMATIONS.

Quaternary.
Recent.
(Alluvium.)
Pleistocene.
(Diluvium.)

Tertiary.
Pliocene.
Miocene.
(Molasse.)
Oligocene.
Eocene.
(Flysch.)

Mesozoic.
Cretaceous.
Chalk.
Upper Greensand.
Gault.
Lower Greensand.
Wealden.
Jurassic.
Oolite.
Lias.
Triassic.
Rhætic.
Keuper.
Muschelkalk.
Bunter.

Palæozoic.
Permian.
Magnesian Limestone.
Carboniferous.
Coal Measures.
Millstone Grit.
Carboniferous Limestone.
Devonian or Old Red Sandstone.
Silurian.
Ordovician.
Cambrian.

Archæan.

some of their results are necessary in order to make geography—the description of the actual surface of the Earth—intelligible. The rocks of which the primitive crust of the Earth was composed must have been subject to the disintegrating effects of weather as soon as they were elevated above the level of the sea. The material worn off them must have accumulated on shores or on land-slopes, and in time become itself consolidated into new kinds of rock, which were elevated and worn away in their turn to give rise to fresh sediments, and so on for incalculable ages. Before the appearance of life on the globe there was no clue as to the relative age of rocks except superposition; but since that era most sedimentary formations contain distinctive fossils which enable rocks of approximately the same age to be recognised in distant places, and so make possible a fairly complete classification. The whole series of sedimentary rocks is nowhere found, but large portions of different parts occur in several places, and allow the order of the whole to be ascertained.

Order of the Rocks.—The most ancient sedimentary rocks known contain no traces of life; they are of a crystalline texture, and often foliated or crumpled in consequence of subsequent change, the process of change being termed metamorphism. The series is known as *Archæan* on account of its great antiquity; gneiss and schist are typical representatives.

The sedimentary rocks containing fossils are divided into four great groups, according to age, known as *Palæozoic* (old life) or *Primary*, *Mesozoic* (middle life) or *Secondary*, *Cainozoic* (modern life) including *Tertiary*, and *Quaternary* or *Post-Tertiary*. The physical character of the rocks does not differ so much as their varying age might lead one to expect,

but in a very general way the Primary rocks are the hardest and most durable, the Secondary are less compact, the Tertiary still more friable, and the Quaternary usually consist of incoherent sands, gravels and clays. Yet very hard rocks may occur even in the youngest formations. The great groups are subdivided into formations which consist of different sets of strata, to each of which a special name has been applied. The table on p. 51 shows the position of all the chief and some of the local formations mentioned in this volume, but it is not to be taken as representing the views of any one geologist ; it attempts to generalise the facts which most geologists agree in accepting.

Primary rocks are of peculiar importance on account of their great wealth in valuable minerals. The quartz veins associated with the Cambrian and Silurian strata are rich in gold and the ores of other metals ; but the Coal Measures of the Carboniferous system are economically the most important. Coal is also found in more recent rocks, but the best coal, which occurs in the great fields of western Europe, the greater fields of eastern America, and the greatest fields of all in China, is of Carboniferous age. The association of iron-ore, limestone for supplying a flux, and highly refractory sandstone suitable for lining furnaces enables the manufacture of iron usually to accompany the mining of Carboniferous coal. Generally speaking the surface forms of a country underlain by the more recent rocks are less rugged, and in temperate climates the soil is more fertile than that of ancient strata ; but the type of scenery depends less on the age of the formation than on the nature of its rocks. Amongst the rock-types common to all formations which determine scenery, it is sufficient to mention *limestones* (which may be metamorphosed into *marble*), *conglomerates* and *breccias*—the pebbly or angular fragments of which are often cemented by limestone ; *sandstones*, which may be fine or coarse in grain, compact or friable, and may be metamorphosed into *quartzite ;* and *clays* (some soft like mud, others stiff or set with stones) which may be metamorphosed into *shale* or *slate*. Every one of these rocks produces a distinct variety of scenery, recognisable by the practised eye.

In addition to the sedimentary and metamorphic formations account must be taken of *igneous rocks*, the origin of which may range in time from the pre-Archæan period down to the present day. They are of two classes, *Plutonic* which have solidified from fusion under the pressure of other rocks in the form of masses, dykes or intrusive sheets, of which granite and some basalts are examples, and *Volcanic* which have poured out on the surface and solidified in the air or under water. Igneous rocks give great variety and character to a landscape, especially when they occur among sedimentary strata, and the features they produce are usually of great geographical significance. For instance, the old volcanic necks which

FIG. 25.—*Diagrammatic section of an old volcanic neck forming a crag, with a "tail" of boulder clay.*

project as steep rocks above the level surface of a plain furnished natural sites for ancient fortresses, and mediæval castles which ultimately formed the nucleus of modern towns.

Features due to Crustal Movements.—The crust of the Earth is subject to movements of various kinds which result in elevations or depressions of the surface as explained in Chapter IV. Where the crust is crumpled into a series of folds, mountain chains of great height are ridged up, characterised by a succession of lofty ridges separated by deep parallel (longitudinal) valleys. The arch of the folded strata is called in geological terminology an *anticline* or anticlinal fold, and the trough a *syncline*. When the amplitude of the folding is great the rocks may be thrown into very complicated convolutions, the strata being even reversed the lower over the upper, or torn apart. A good example of a folded and eroded mountain system is shown in the section across Switzerland (Fig. 130). All the lofty mountain ranges of the world, as shown in Fig. 19, are fold-mountains which were upridged in the Tertiary period, and are thus, geologically speaking, things of yesterday. Other forms of crust-folding occur, though not so strikingly; the *monoclinal fold* for instance produces a steep-sided and flat-topped elevation.

FIG. 26.—*Diagrammatic section across a range of fold-mountains before erosion has set in, showing successive anticlines and synclines.*

Mountain and valley forms of quite a different type are produced when strata subjected to severe stresses relieve the strain not by folding but by cracking, and blocks of the crust are thrust up or allowed to drop down between parallel cracks or *faults*. The raised or lowered masses may retain their original position or be tilted, and in either case they give rise to *crust-block mountains* (the *Schollengebirge* of the Germans), or to *rift-valleys* (*Graben*), such as the upper Rhine plain or the great rift-valleys of the Dead Sea, Red Sea, and East Africa (Fig. 445). These, when of relatively recent origin, are wild and rugged, giving rise to a country full of grand

FIG. 27.—*Diagrammatic section of Crust-Block Mountain.*

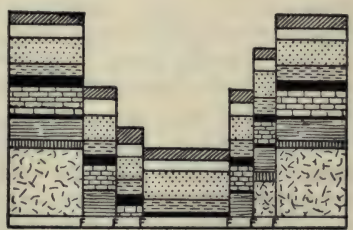

FIG. 28.—*Diagrammatic section of Rift-Valley.*

scenery but presenting great obstacles to traffic. The movement of crust-blocks separated by a great fault is still to be detected in many cases; it usually occurs in the form of slight slips accompanied by earthquake shocks. Lines of faulting are of course lines of weakness in the crust, and consequently afford a favourable opportunity for the outbreak of volcanic activity. Hence mountains of volcanic accumulation and even great plains of level lava, which originally flowed in a molten state from long fissures in the crust, are met with in the neighbourhood of rift-valleys. Typical volcanic cones sometimes remain as prominent features in the scenery long after all volcanic activity has ceased. The old craters are often occupied by lakes without inlet or outlet and sometimes very picturesquely framed in cliffs (Fig. 191). Where volcanic agency has failed to assert itself on the surface, masses of igneous rocks may be intruded amongst strata in the form of *laccoliths* thrusting up the surface into a dome (Fig. 29).

FIG. 29.—*Diagrammatic section of an uneroded laccolith (black).*

Features due to Erosion.—As soon as a rock-surface is exposed to the air it may be attacked by the chemical action of the water and dissolved gases, by the alternate heating and cooling due to radiation, by wind driving sand particles, by the dissolving and abrading action of running water and sliding detritus, by frost, or by the more massive action of moving ice. The result is that in every part of the world high ground is always being eroded or eaten away, and the broken material swept off to lower levels. Every different kind of rock resists the "tooth of time" in its own manner and to a particular degree. Beds of clay or loose sand are washed by rain into fantastic forms, according to the varying hardness and coherence of their parts. Limestones, no matter how hard, are dissolved by rain or rivers, giving a very distinctive type of country, caves or even underground river channels being produced, into which the surface drainage sinks by rifts and swallow-holes which have been similarly dissolved out, and the land is left dry and relatively barren. These features are so characteristic of the Karst district of the Adriatic coast that the name *karst phenomena* has been applied to them (see Fig. 156). The more compact rocks weather differently according to their texture and arrangement. Thus a coarsely crystalline granite decomposes into clay and sand along the lines of cracks, and in the process assumes the bold serrated outlines familiar to the observer in all granite mountains; but the closer grained basalt is much more durable. A dyke or sheet of igneous rock embedded in sedimentary strata stands out sharply when the softer rocks have been weathered away. Again, the forms of a region where the strata lie horizontally like the Grand Canyon district of the United States, differ from those of one where the rock sheets dip regularly in one direction. The dip-slope weathers more slowly than the steeper edge or *escarpment*, which runs along the direction of the strike (Fig. 30). This is seen best on

sea-coasts and river-valleys where the character of the cliffs carved out by the waves or current varies in accordance with the structure as well as the resisting power of the rocks. Except in the newest volcanic formations the surface of all exposed rocks has been greatly altered by weathering, and so far as their scenery is concerned the upraising of the land has served mainly to guide the ceaseless action of the tools of erosion. The result of prolonged erosion on an ancient plateau is to cut it up into detached masses of mountainous magnitude, which on account of their origin have been called relict-mountains, or mountains of circumdenudation.

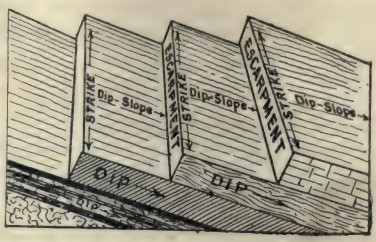

FIG. 30.—*Diagram illustrating dip, strike, dip-slope, and escarpment.*

River Work—Destructive.—As the streamlets flow down any slope to meet and form a larger stream they begin to wear a channel for themselves, which gradually cuts deeper and deeper into the ground, the sides being steadily widened by weathering as the channel is excavated, so that the lower valley of a great river becomes very wide and nearly flat. In a region where the atmosphere is dry, weathering is retarded, and the river as it cuts its way downwards leaves the rocks sharp and steep, as may be seen in the canyons of the Colorado. The steeper its bed the more rapidly does a stream erode, hence rivers are most powerful in destruction near their heads, and tend to cut back their watersheds. Thus a water-parting which was once straight may become sinuous, and in time the rivers of the steeper slope may actually tap or capture the upper waters of the adjacent drainage area, and a river system which on a new land surface is comparatively simple, becomes extremely complicated when the land has been long subjected to erosion (Fig. 36). As a river deepens its bed below the general level of the valley floor the deposits of stones and gravel which had been stranded on its margins are left at a higher elevation forming level *terraces* or *benches* (Fig. 32). All mountain ranges become seamed with lateral valleys of erosion. A new land surface is usually irregular, with hollows in which lakes are formed by water accumulating until it overflows; but as the land grows older the lakes are either filled up with sediment carried in by streams, or drained by the escaping river deepening its channel, and the old lake-bed becomes an alluvial plain. Any abrupt change of level on a new land surface, or any hard bed of

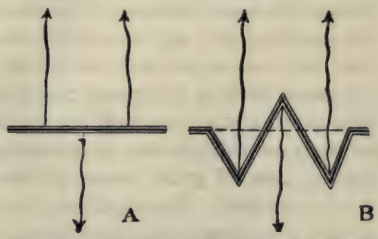

FIG. 31.—*Diagrammatic plan of a straight watershed* (A) *showing rivers extending their valleys headward* (B).

rock in the course of a mature river forms a waterfall; but in time each sharp step is cut back to form a steep slope in a gorge through which the water foams in rapids, and ultimately the river grades its course and flows uniformly along a uniform slope.

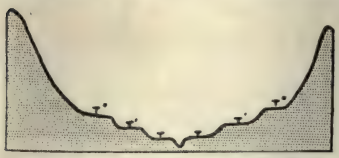

FIG. 32.—*Diagrammatic section across a River Valley showing Terraces* (T).

As a long river flows on its way it is deflected to a certain extent on account of the Earth's rotation. This was first detected by von Baer, and is included in the statement of Ferrel's Law thus :—

If a body moves in any direction on the Earth's surface, there is a deflecting force arising from the Earth's rotation which tends to deflect it to the right in the northern hemisphere, but to the left in the southern hemisphere.

The rivers of the northern hemisphere always pressing more heavily against their right bank, cut it back as a cliff, while the left bank is left low and flat, being composed of alluvium deposited by the stream. This is strikingly illustrated in the great rivers of Russia and Siberia, where the "high bank" and "low bank" sides of the stream are terms used where we speak of the right bank or the left. It should be remembered that the right bank of a river is that on the right hand of a person looking downstream.

River Work—Constructive.—As a river approaches its mouth the gradient of its bed diminishes, the water flows more slowly, and is no longer able to sweep along the load of stones and gravel, which are accordingly dropped near the sides, to be swept forward spasmodically by floods. Eventually even the sand and mud subside upon the flood plain across which the river meanders in constantly changing loops. At the mouth the final detritus may be swept away and dispersed along the shore by tidal or other currents, or if the river enters a gradually deepening and widening inlet of the coast, the to-and-fro tides may distribute the sand and mud in banks or bars, as in the Thames or Tay, or spread it over so great an expanse as to produce no obstruction, as in the Firth of Forth. But all great rivers which enter a lake and many which enter the sea deposit their sediment in the form of a delta, which grows gradually seaward, and the water crosses it in many and variable channels (Figs. 362 and 441). The margin is often lined with lagoons separated from the sea by bars of mud; but the delta itself is a flat expanse of very fine soil. The effect of floods in rivers flowing over a nearly flat plain is to cause a deposit of alluvium along the sides of the stream, and a consequent silting-up of the bed, which results in the river flowing at last along an embankment above the general level of the plain and sloping gently on both sides down from the river. When a flood occurs the banks are apt to burst, and the river descends upon the low ground with tremendous force, often forming a new channel for itself to the sea.

This frequently happens on a small scale in the lower Mississippi, and to a far greater degree in the Hwang-ho (Fig. 264). The flood-plains and deltas of great rivers in latitudes which ensure a genial climate are the most fertile lands in the world, and have been the cradles of all the great nations of the ancient East—Assyria, Egypt, China, and India.

When a stream from a mountain valley flows out on to a plain, or a flat-floored longitudinal valley, the sudden change of slope causes the deposition of the detritus it carries down in the form of a *fan* of alluvial soil, over which the stream usually flows in several branches. The alluvial fan is a form of accumulation intermediate between the delta laid down in still water and the *scree* or *talus* of detached rock fragments which grows, sometimes as a magnificent sweep of boulders, at the base of a line of cliffs. In arid regions this work of rivers is very characteristic on account of the absence of rain which in other regions washes away and rearranges the alluvium.

FIG. 33.—*The Alluvial Fan of the Ill opposite Leuk in the Rhone valley. Contours at every* 100 *feet.*

Accumulations due to Wind and Ice.—Wind is powerful in shifting and rearranging dry surface deposits. Hence, in all arid or desert regions there are vast stretches of sand heaped up by the wind into *dunes* or hills, sometimes several hundred feet in height, sloping gradually on the side towards the prevailing wind and falling steeply on the sheltered side. Dunes, unlike all other geographical features of the land, move like waves, preserving their size and form, but gradually invading and destroying the fertile margins of the desert. Even in moist climates small dunes are formed on sandy shores, and must be fixed in order to protect the neighbouring land, by planting grasses or trees with spreading roots upon them. The finer dust blown off from deposits of clay or very minute sand is believed to be the origin of the peculiar earthy deposit known as *loess*, which occurs on the borders of the Alps, in the Mississippi valley, and to a remarkable extent in northern China, where it completely conceals all other formations. Another accumulation common in tropical countries is a stiff red clay called *laterite*, the result of the weathering of igneous rocks. A fourth and very important accumulation is the *boulder clay* or *diluvium* left by ice sheets or in extra-glacial lakes. Large tracts of the low ground of northern Europe (Fig. 52) and America (Fig. 329) are covered with this clay, which has had the effect of greatly changing the surface, causing the formation of innumerable lakes and associated river systems which have not yet had time to drain the basins or to entrench themselves deeply in the land.

The Geographical Cycle.—Professor W. M. Davis has formulated the geographical results of erosion and crustal movement in a theory

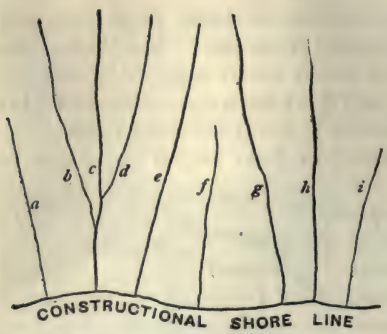

FIG. 34.—*Cycle of Erosion. I.*

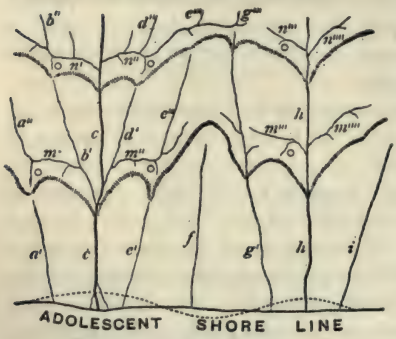

FIG 35.—*Cycle of Erosion. II.*

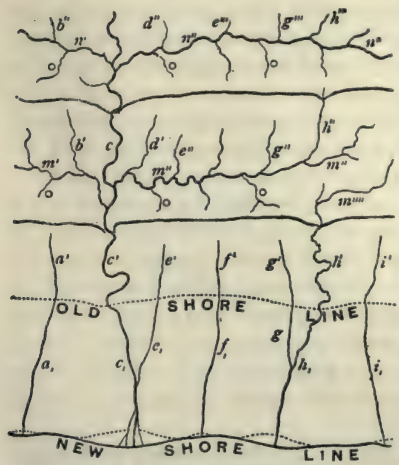

FIG. 36.—*Cycle of Erosion. III.*

which explains the progressive development of a land surface. The time which is required for a land surface to be worn down low and flat by the action of erosion he terms a *cycle*. The low flat surface which is the final result of erosion is termed a *peneplain*. It is only possible here to consider a special case which illustrates the general application of the theory. Thus Professor Davis imagines a varied mountainous region gradually sinking, and the sea converting the submerged valleys into rias, while the rivers are shortened until the upper tributaries reach the sea as independent streams. Meanwhile the mountains are being reduced by erosion and the sea-margin built up by deposition, until, in the course of long ages, the mountains are worn down and the shore silted up to form a nearly flat expanse.

If now a period of elevation follows, and the uplift is greatest in the region of the old mountains, the sea-bed will be raised into a new land of stratified rocks having a gentle seaward dip down which the new rivers will find their way, guided by the slight inequalities of the surface. The new rivers formed in consequence of the slope of the land are termed *consequent* streams (Fig. 34, *a* to *i*). If, after a time, the uplift ceases, these rivers will continue to cut their channels down, and entrench themselves in valleys which will be enlarged by erosion, and at the same time cut down to a slope of equilibrium in which the waste of the valley floor is balanced by the deposit of sediment. As the original or conse-

quent valleys are deepened, the opportunity is afforded for streams flowing in on the side to erode for themselves valleys which may be termed *subsequent*. While consequent rivers flow down the dip slope of the strata subsequent rivers run at right angles, along the strike (Fig. 35, *m*, *n*); they naturally are formed along the weaker or softer strata. As the valleys of subsequent rivers grow headward along the guiding line of the strike, they may tap and capture the upper courses of other consequent rivers which have had a gentler slope than that of their more powerful neighbour to which the capturing streams are tributary. Finally a new set of small streams is called into existence, flowing down the steep face of the escarpment to the subsequent river, and these Professor Davis terms *obsequent* (Fig. 35, *o*). The result of all this river-action is to cut up the uniform slope of the new land into a series of inland sloping escarpments corresponding in number to the harder strata and trenched by the valleys of the sea-ward flowing rivers. After long ages the valleys will be so widened, and the intermediate elevations so much reduced, that the whole surface assumes the old-age form of the peneplain; and across it the ancient rivers will meander in winding courses, with no gradient sufficient to enable them to work (Fig. 36). Projecting masses of hard rock which remain projecting above the peneplain are termed *monadnocks* from Mount Monadnock in New England, a representative instance.

If at this stage a fresh uplift of the land should occur, a new coastal plain will be formed, the old consequent rivers will be quickened by the increased slope of their beds, and commence to incise their valleys anew, and as the deepening goes on the subsequent and obsequent streams will also be revivified in their turn, and a more complete adjustment of river to land obtained in the second cycle than was possible in the first.

The theory of a geographical cycle is illustrated here by a single case in a very simple form—so simple that it probably corresponds with the evolution of no actual land surface. In nature innumerable irregularities occur; the varying arrangement and hardness of the rocks produce a great variety of forms, and the alternate elevations and depressions of the land before the work of any one stage of a cycle has had time to be completed, makes it difficult always to recognise what has really taken place. It must also be remembered that processes of faulting, tilting, warping, and folding are often simultaneously at work, so that few large areas of the Earth's surface owe their geographical forms to any one process. Still rivers always tend to adjust themselves to the land over which they flow, and so carve and mould it into definite and characteristic forms.

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CHAPTER VI.—THE OCEANS

By Sir John Murray, K.C.B., F.R.S., and Hugh Robert Mill, D.Sc

The Hydrosphere.—In the atmosphere the region with which we are most familiar is the lower surface in contact with the land or sea ; the higher air requires study—from the geographer's point of view—only in order to find the causes of the movements in the lower. But in the hydrosphere it is the upper surface which plays the most important part in human affairs, while the depths of the ocean have only to be studied in order to explain the superficial movements and actions. Lakes, rivers, the interstitial water of the lithosphere, and the water vapour of the atmosphere may all be regarded as extensions of the hydrosphere. The general form of the ocean basins is a vast depressed plain, yet the floor of each ocean is diversified by ridges and troughs, the deepest parts frequently occurring not in the centre of the oceans, but comparatively near shore. The configuration of the ocean floor is of great practical importance for laying telegraph cables ; but it is not necessary to describe it in detail here. The greatest depth hitherto reported in the ocean is, 5,269 fathoms (or six miles) to the east of the Ladrones in the North Pacific. In the south-west Pacific to the east of the Kermadec Islands soundings of 5,155 fathoms and 5,147 fathoms were obtained. These are the only records of depths exceeding 5,000 fathoms, though soundings in depths between 4,000 and 5,000 fathoms are comparatively numerous. The greatest depth known in the Atlantic is 4,660 fathoms, to the north of the West Indies, while in the Indian Ocean no depth approaching 4,000 fathoms has hitherto been found, the deepest sounding being little over 3,200 fathoms. It is worthy of remark that Sir James Clark Ross ran out

Fig. 37.—*Configuration of the Bed of the Atlantic Ocean, showing contour lines of* 100 *fathoms* (*dotted*), 1,000, 2,000 *and* 3,000 *fathoms of depth. All over* 3,000 *fathoms is in solid black.*

4,000 fathoms of line in the Southern Ocean, to the south of South Georgia, but in 1904 Dr. Bruce found the depth at this spot to be only 2,660 fathoms. The floor of the ocean on the whole lies about 2½ miles below the average level of the continental land surface (see Fig. 24).

Land and Sea.—The margin of the hydrosphere where it touches the protuberant parts of the lithosphere is the primary dividing line of the Earth for most human purposes, separating the water from the land. The exact areas of the oceans and the land cannot be ascertained until the Arctic and Antarctic regions have been fully explored, but for the known parts of the Earth the proportion of sea to land is about 2·5 to 1, or in other words 72 per cent. of the surface is sea, and 28 per cent. land. The whole surface of the Earth measures approximately 148,570,000 square sea-miles, or 196,940,000 square miles ; the hydrosphere may be taken as covering about 142,000,000 square miles, and the land about 55,000,000.

Superficial Divisions of the Hydrosphere.—The surface of the hydrosphere is most clearly marked off by land into separate portions in the northern hemisphere, the larger of these being called oceans, while the smaller are called seas. Seas have been classified in various ways ; the simplest classification takes account of (1) *Inland Seas* which are entirely surrounded by land ; the Caspian is the only example, the smaller bodies of inland water being called lakes ; (2) *Enclosed Seas*, which are almost surrounded by land, but joined to an ocean by one relatively narrow channel, *e.g.*, the Mediterranean or the Red Sea ; and (3) *Partially Enclosed Seas*, which are connected with the ocean by two or more openings, being often marked off from it by a chain of islands, *e.g.*, the North Sea or Japan Sea. Partially enclosed seas may be farther divided into shallow and deep, the latter being sometimes separated from the ocean by a barrier which may not quite rise to the surface, as in the case of the Norwegian Sea in the North Atlantic Ocean. Groups of seas "partially enclosed" by island loops along the coast of a continent, as for example on the east coast of Asia, are sometimes called fringing seas.

The early Greek conception of an insular land surrounded by the river Oceanus (Fig. 3) gave its name to the *ocean*, or, as it was called in the time of Columbus, the "Ocean Sea," but the name is now applied to the portions of the hydrosphere separated by the continents. These are the *Atlantic*, between Europe-Africa and America, the *Pacific* between America and Asia-Australia, and the *Indian* between Asia-Australia and Africa. Each of these oceans may be divided into a northern and southern part by the equator. The southern boundary of the three oceans, according to the rule generally adopted, is the Antarctic Circle, within which lies the Antarctic Ocean ; but for many purposes it is more convenient to take the parallel of 40° S. as the dividing line, and call the great ring of shoreless water to the south the *Southern Ocean*, the term Antarctic being appropriately enough applied to its southern edge. The northern limits of the Atlantic and Pacific are usually drawn at the Arctic Circle, and the water

surrounding the north pole is called the Arctic Ocean, but there are reasons for considering the whole Arctic basin to belong to the Atlantic Ocean, of which it forms the Arctic Sea.

Islands.—Two distinct and contrasted types of island are readily recognised. (1) *Continental Islands* which do not as a rule lie far from continental shores, and usually consist of crystalline and sedimentary rocks similar to those found on the neighbouring mainland, from which they are usually separated by shallow seas. In fact such islands generally rise on the continental shelf, and in many cases have been separated from the continent at a period geologically recent. Examples of these are the British Islands, only separated from the mainland in Quaternary times, Sicily, Japan, the Malay and Greek archipelagoes, and the close island fringes of fjord-riven coasts. Madagascar, New Zealand and New Caledonia are examples of a somewhat different class of continental island, being separated from their nearest mainland by a considerable distance of deep water. Continental islands as a rule show a community of flora and fauna with the neighbouring land. (2) The second class consists of *Oceanic Islands* which are situated far from any continent, the islands, singly or in groups, forming the peaks of submarine mountains which rise from the great depths of the ocean, like St. Helena or the Fiji Islands. Oceanic islands do not as a rule contain any of the typical rocks of continents, *i.e.*, sedimentary strata, metamorphic rocks, or such acid rocks as granite. They are either volcanic, forming the cones or craters of active or recently extinct volcanoes, in which case they may be mountainous and of considerable height (see Fig. 326), or else they are of organic growth, usually mainly composed of coral, and then they are typically low and flat, unless they have been upheaved. Reef-building corals and other lime-secreting organisms, which make up coral islands, flourish best in pure sea water where the temperature never falls below 70° F., and where the annual range of temperature does not exceed 12° F. Hence coral formations are practically limited to the warmer tropical seas. They are of several kinds, the simplest being the *fringing reef*, a mere edge of growing coral in the shallow water below low-tide mark. The *barrier reef* is found farther out, and is separated from the shore, to which it runs more or less parallel, by a stretch of shallow water where detached masses of coral often rise to the surface. The greatest reef of this kind lies off northern Queensland, forming a sheltered channel for steamers along the coast (see Fig. 294). Many of the volcanic islands of the Pacific are almost completely surrounded by a barrier reef. The *atoll* is the most characteristic form of coral land. It consists of a narrow reef enclosing a shallow lagoon with no central island (see Fig. 326). Coral islands are raised above the level of the sea either by upheavel or by waves breaking off and piling up masses of the coral. Two theories are advanced to account for the origin of atolls and barrier reefs, each of which demands a solid foundation coming to within 20 fathoms of the surface. The theory of Charles Darwin requires that the

foundation is undergoing slow subsidence; that of Sir John Murray is equally applicable to a stationary, sinking or rising region. As a matter of fact many instances are known of atolls having been elevated high above sea-level after their formation was completed. Oceanic islands have all a restricted and highly individual flora and fauna as a result of their remoteness from continental land.

Near shore or in fresh water various minor classes of islands may appear, due to deltaic formations, or to the division of a river into branches which afterwards reunite. These islands, and indeed continental islands in general, are to be viewed as forming part of the continental area of the Earth, the separation being frequently only a temporary stage in the evolution of the land.

Sea-Water.—The vapour which is always rising from the surface of the sea is condensed by contact with elevated land, or on account of some atmospheric change, and precipitated as fresh water (rain or snow) over the surface of land or sea. The water flowing over or through the land dissolves part of the substance of the rocks, the most soluble matters like common salt and the sulphates of magnesia and lime, being taken up in largest proportion, but also carbonate of lime (the solution of which is promoted by the dissolved carbonic acid absorbed from the air and soil) and silica. These materials collect in the basins of internal drainage into which the rivers from one-quarter of the land-surface flow, and there give rise to salt lakes; but as the rivers draining three-quarters of the land reach the sea the ocean has become a vast depository of all soluble salts, and hence its water tastes both salt and bitter. The Atlantic is pre-eminently the ocean of land-drainage; including the Arctic basin, fully one-half of the land-surface slopes towards and drains into it. The Pacific and Indian oceans receive comparatively few rivers.

Although sea-salt is practically identical in composition in all parts of the ocean the amount dissolved in the water varies from place to place, the proportion being of course greater in regions where there is great evaporation and little or no rainfall, such as the Red Sea, or the trade-wind belts of the tropics, and less where there is a heavy precipitation such as the region of the equatorial calms. The salinity is also much lowered in estuaries off the mouths of large rivers, and in places where icebergs are melting. The fact that the water of the sea is salt and not fresh has an important influence on the action of heat. If a column of sea water of uniform salinity throughout is cooled from above it steadily grows denser, and the surface layers sink and in this way distribute the low temperature by convection throughout the mass. Thus the whole of a detached portion of sea water assumes rapidly the temperature of the coldest season of the year. If the cold is very severe, when the freezing point (28° F. for sea water of normal salinity) is reached the mass should freeze solid. This, however, never takes place, because the water of the ocean is never at rest, and chemical changes occur in

the freezing of sea water which lower the freezing-point of the portion remaining liquid. It usually happens that the surface water is less saline, and consequently so much lighter than the deeper layers that in spite of its lowered temperature it remains floating on the surface until it freezes. When a column of sea water of uniform salinity is heated from above, the surface water evaporates and the remaining liquid near the surface gains more in density by concentration than it loses by expansion, and thus sinks and raises the temperature of the whole, a result that could never occur with fresh water. But it is only in places like the Red Sea, where the superficial layer is not freshened by rain or rivers, that this effect is commonly produced. The specific heat of sea water is a little less than that of fresh water, so that the amount of heat which would raise a quantity of fresh water 9·35° F. in temperature, would raise the same quantity of sea water 10°. Sea water is also a better conductor of heat, so that it is affected by the Sun's rays to a greater depth than fresh water. The equilibrium of the water of the ocean may thus be destroyed in many ways, and hence it is more readily set in circulation than fresh water, and the causes of its movements are more difficult to ascertain. Sea water also contains in solution a quantity of the various atmospheric gases which bears a definite relation to the temperature at which they were absorbed.

FIG. 38.—*The salinity of the surface water of the Atlantic Ocean, showing by the density the regions of great evaporation and concentration in the Red Sea, Mediterranean Sea, and Trade-wind areas, and the regions of dilution due to rivers, to rain in the equatorial belt and to melting ice in the far north and south.*

Oceanic Deposits.—The chemical action exerted by the complex solution of salts and gases found in sea water produces many interesting effects both as regards the action of living organisms in secreting the material for their shells and skeletons, and the changes brought about in the deposits forming on the bottom. For a distance from land varying with the set of ocean currents and prevailing winds, but rarely exceeding 300 miles, material derived from the shore makes up the larger part of the deposits on the sea-bed at all depths and these are consequently termed *Terrigenous*. Outside this limit the deposits are termed *Pelagic*, as they are formed in the free ocean beyond the influence of land except by the occasional fall of dust and the drifting of volcanic pumice.

In temperate and tropical seas far from land the deposit, where the depth is comparatively slight, consists chiefly of the dead calcareous shells of the minute organisms which swarm in the surface water. The most wide-spread of these deposits is *Globigerina Ooze*. But when the depth is great the lime of those shells is nearly or completely dissolved out when they are falling through the vast mass of water or lying on the bottom, and there is left only a *Red Clay* composed of clayey matter mixed with meteoric and volcanic dust. It is by the occurrence of these pelagic deposits that the theory of the permanence of ocean basins is largely supported. In the fresher and colder water of the polar seas siliceous organisms predominate and their remains give rise to the *Diatom Ooze* so characteristic of the Southern Ocean where it approaches the Antarctic Circle.

Tides.—It is only in the great ring of the Southern Ocean and in the vast expanse of the Pacific that the tide-raising powers of the Sun and Moon can produce their full effect. The ocean tides show a rise of the water-level by a foot or two when the crest of the semi-diurnal tidal wave passes the place of observation, and a fall of a foot or two when the trough passes six and a half hours later. On entering shallow water the tidal wave becomes changed into a current, often of considerable strength. Such currents may also be produced by shoals in the open sea, but they find their fullest development along flat shores where the submergence and uncovering of the beach is often a very impressive sight. The tidal currents sweeping through the rocky channels between islands often give rise to dangerous eddies and whirlpools, and may render the channels useless for navigation during the strength of the tide. On the other hand, the influx of the flood tide in the lower courses of the rivers of a flat country often enables shipping to reach ports which would otherwise be inaccessible. The greatest rise and fall of the water produced by the tide occurs in long funnel-shaped bays or estuaries, the difference between high and low water at spring tide at the head of the Bay of Fundy being as much as seventy feet; but the average tidal rise and fall round the coasts of most countries does not exceed ten feet. The subject of the tides, the times of their occurrence, and their height is of a most complex character owing to the interference of various wave-systems; but on the whole, tidal influence is not one of the main factors in the circulation of the oceans.

Temperature of Ocean Surface Water.—The mean daily range in temperature of the surface water of the ocean is not more than 1° F., while that of the air resting upon it is three times as great. The contrast of the ocean surface with the land as regards temperature is thus complete. Between the polar regions where the surface of the sea is freezing, and the Red Sea and Persian Gulf where the temperature of the water often exceeds 90°, there is an extreme range of 70°. The extreme annual range in anv one part of the ocean surface does not

exceed 53° and this only occurs off the coasts of Newfoundland and of Japan, where the same area is occupied at one season by cold water coming from the Arctic regions and at another by warm water from the tropics, and it is not a measure of heating and cooling in the same water. Viewed broadly the hydrosphere is divided into five zones of temperature arranged roughly parallel to one another, but more distinct on the western than on the eastern sides of the oceans. These are a *Circumtropical zone* of high temperature (over 80°) and small annual range, two *Circumpolar zones* of low temperature (under 50°) and small annual range, and between these and the hot zone two *Intermediate zones* which show a great annual range of temperature produced by the mingling of the waters of the two others. The hot belt is due to the intensity of solar radiation, and it is important because all coral islands occur within it. The cold belt of small range is produced by the low polar winter temperatures and the melting of ice in the summer.

Temperature of the Deep Water.—In the open ocean at the depth of 50 fathoms it is probable that the temperature does not change by so much as 2° F. at any one place throughout the year; and below the depth of 100 fathoms there is no evidence of any annual change of temperature whatever. But differences between the temperature of one part of the ocean and another may be as great as 42° at 100 fathoms, 20° at 500, and 8° at 1,500 fathoms. Everywhere in the open ocean, but especially in the tropics, the temperature diminishes rapidly from the surface to about 400 fathoms, and then very gradually to the bottom, where the temperature of the water is quite independent of latitude. At the greatest depths the temperature varies from 32° to 35°, even at the equator. The average temperature of the whole mass of the ocean is probably between 38° and 39°, and it may be looked upon as a body of cold water covered with a thin warm layer in the tropics. In the north-western parts of the Atlantic and Pacific the warm water extends to a much greater depth than in the tropics, and it is thinnest of all in the south-eastern parts of the three oceans.

Circulation of Enclosed Seas.—The whole mass of water in the ocean is believed to be in continual though very slow motion, because there is no abrupt change of temperature anywhere between masses of water at the same depth and not separated by a ridge. But in enclosed seas, which are cut off from the ocean by a barrier, the temperature corresponds to that of the ocean only from the surface to the depth of the barrier; below that the water retains the same temperature unchanged to the bottom. Thus the Mediterranean has a uniform temperature of 55° from 190 fathoms, the depth of the Strait of Gibraltar, to the bottom in 2,400 fathoms (the Atlantic has a temperature of 35° at the latter depth); and the Red Sea has a temperature of 70° from 200 fathoms, the depth of the Strait of Bab-el-Mandeb, to the bottom in 1,200 fathoms. Enclosed seas are not as a rule stagnant, but

their waters circulate on account of their differences in salinity. Thus the water of the Red Sea and the Mediterranean is much salter and denser than that of the ocean, so that when the level of the enclosed sea is reduced by evaporation the comparatively light ocean water flows in as a surface current, while the dense warm water sets outwards as a return current along the bottom. In the shallow Baltic and the deep Black Sea, on the contrary, the numerous rivers which flow in make the water so fresh that it overflows as a surface current, while the dense ocean-water flows in as an under-current. The Baltic is, however, very variable in its circulation on account of the action of wind, and the Black Sea is so deep that its lower waters are absolutely stagnant and putrid, unfit for the support of animal life of any kind. In shallow partially-enclosed seas, such as the North Sea, tidal currents play a notable part in the circulation of the water.

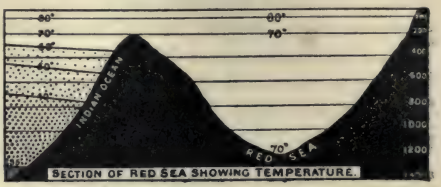

FIG. 39.—*Diagram showing temperature of Red Sea.*

Action of Wind on Water.—When wind strikes the surface of water, part of the surface is depressed and the neighbouring portions ridged up; but, the force of gravity tending to restore the level surface, a wave form is generated which sweeps over the surface of the sea as a line of rollers. It is only the form that advances as in the tidal wave, the actual particles of water simply rise and fall, but the elasticity of the water keeps up the movement after the wind which generated it has died away; in fact the surface of the ocean is never quite at rest. The largest waves raised by wind have a length from crest to crest of about one quarter of a mile and a height from hollow to crest of 50 feet, but waves of this magnitude are rare. On entering a shallow, the lower portion of the water in contact with the bottom is retarded, and the upper part toppling over falls in spray as a breaker. On shores facing the steady prevailing winds the thunder of the breakers on the beach is unceasing throughout the year, and in many such places it is almost impossible to land. The power of waves to erode the coast is considerable, but rapidly diminishes with depth, so that at 100 fathoms the largest ocean waves cannot do more than stir the finest mud on the bottom. The wind acts also in another way. A fresh breeze or a gale blows off the crests of the waves in spray which is driven before the wind; a gentle breeze suffices to cause a thin stratum of the surface layer of water to slip before it, so that if the wind continues long enough from a definite quarter the surface water begins to drift in the same direction. But since the driving of surface water from one position tends to lower the level and the heaping up at another place tends to raise it, the hydrostatic equilibrium is destroyed and has to be restored by vertical movements, reaction currents, and upwelling on the windward shores. The wind

thus gives rise not only to horizontal but to vertical movements in the sea, and these vertical movements are strengthened when assisted by the slopes of a shore. An on-shore wind (that is a wind from the sea towards the land), when long continued heaps up warm surface water against the shore which displaces the cold water to a considerable depth. On the other hand an off-shore wind causes an upwelling of deep and cold ocean water against the land.

Circulation of the Oceans.—The energy of the Sun, which acts directly by effecting changes of temperature, indirectly by evaporation and precipitation, producing changes of density, and by giving rise to the whole system of the winds, is the main cause of the circulation of the oceans. It is unnecessary to inquire which of the direct or indirect solar actions is the most potent factor, since all work together and reinforce each other. It must be remembered too that the rotation of the Earth, which exercises a directive influence on rivers and wind, has a precisely similar influence on the moving waters of the sea, causing a deviation towards the right in the northern hemisphere. While the mass-movements of the ocean, mainly due to vertical circulation, are as a rule very slow and only to be deduced from indirect observations, the movements of the surface water in a horizontal sense are rapid and easily observed. They may be roughly divided into drifts and currents. A *drift* is the general movement of the surface water in obedience to the wind ; it is, as a rule, of little depth, slow and uncertain in velocity and direction, stopping when the wind stops, changing when it changes, but in the regions of steady winds producing a great effect. A *current* is a more definite movement, sometimes a sharply defined body of water flowing like a river between the relatively motionless water on either side, at a velocity of several miles an hour, and capable of persisting in its direction even against a temporary change of wind. A great ocean current is however not by any means homogeneous. It consists of strands or threads of water moving with different velocities and often varying in direction. It may contain eddies or still patches and it may extend to a variable depth. This character makes it possible for two equal currents to meet, coming from opposite directions, and yet not neutralise one another, the strands of moving water may slip past each other, or one current may pass underneath, or even cut through the other. The transition between currents and drifts is gradual, and the circulation of the ocean is to be looked on as the final result of a variety of movements which may not at any one time exhibit their typical character.

Speaking very generally the three oceans north of the equator exhibit a surface circulation as if the whole water had been stirred and set in motion in the direction of the hands of a watch ; but in the Indian Ocean the change of the monsoons reverses this circulation during half the year. The three oceans south of the equator show a similar but less complete circulation in the opposite direction, as is explained by Ferrel's law (p. 56) ; and in the centre of each of the great whirls there is an area of rest in

which floating weed accumulates, best exemplified by the "Sargasso Sea" of the North Atlantic (Fig. 40).

Currents of the Atlantic Ocean.—The trade winds blowing from the coast of Africa drive before them two currents, the north and the south equatorial, which are separated by the equatorial counter current running in the opposite direction along the equatorial calm belt from the American coast into the Gulf of Guinea. Part of the north equatorial current enters the Caribbean Sea, but the greater portion of it, turning northward as it flows, sweeps outside of the chain of the West Indies and reinforces the Gulf Stream. The Gulf Stream leaves the Gulf of Mexico through Florida Strait as a river of very salt water at a temperature of 81° on the surface, fifty miles wide and 350 fathoms deep. It flows along the Florida coast at a velocity of five miles an hour, but off Cape Hatteras curves towards the east, and spreads out in a fan shape, growing cooler as it flows, until it merges in a broad drift that sends branches northwards along the coast of Norway and into the Arctic Sea, while the main body, turning east and south, passes the British Islands and returns southwards to join the north equatorial current off the Canaries. Cold currents from the Arctic Sea carry many icebergs along the east coasts of Greenland and of Labrador until they melt in the warm water of the Gulf Stream. The Labrador current passes southward between the North American coast and the Gulf Stream, and is known as the Cold Wall. The position of both currents changes according to the season. The meeting of the warm and cold water is also the cause of the dense fogs characteristic of the Grand Banks of Newfoundland. On account of the large quantity of warm water driven against north-western Europe, the temperature of 40° is found to as great a depth as 900 fathoms off the coast of the British Islands, while in the tropics, where the hot surface water is driven away by the trade winds, water of equal warmth is rarely met with so deep as 300 fathoms. The mass of warm water banked up against the coast of Europe accounts for the exceptional mildness of the south-westerly winds which prevail there.

FIG. 40. — *The Currents of the Atlantic Ocean, showing the typical circulation of water in an ocean, and the relation of the Sargasso Sea to the Gulf Stream.*

The south equatorial current is largely supplied from the cool Benguela current which wells up from deep water off the south-west coast of Africa, and partly, it would appear, by currents drawn in from the

Southern Ocean. It sweeps across to the coast of Brazil, where part turns northward to reinforce the north equatorial current, and the rest flows southward along the coast of Brazil, turning gradually to the east as it comes within reach of the westerly winds.

Currents of the Pacific Ocean.—The circulation of the North Pacific is exactly like that of the North Atlantic but on a larger scale. The *Kuro-Shiwo* or Black Stream of Japan corresponding to the Gulf Stream, the drift of its warm water gives rise to a strong climatic resemblance between north-western Europe and north-western America, while the cold current from Bering Sea helps to complete the analogy of the cold climate of Kamchatka with that of Labrador. In the South Pacific the Humboldt current which flows northward along the west coast of South America is, like the Benguela current of West Africa, largely reinforced by the upwelling of cold water produced by an off-shore wind, which gives to the Galapagos Islands the coolest equatorial climate in the world.

Currents in the Indian Ocean.—The South Indian Ocean closely resembles in its circulation the South Atlantic and South Pacific. There is the same upwelling of cold water along the west coast of Australia that is observed off the west coasts of South Africa and of South America. The south equatorial current turns southward off the coast of Madagascar in several branches which are carried back to the east by the "brave west winds." A warm current flowing through the Mozambique Channel strikes the Agulhas Bank off the south point of Africa, where the bulk of the current is turned back to the east, while a portion continues round the Cape into the Atlantic. The strength of this current on the shallow bank produces one of the roughest seas in the world. When the north-east monsoon is blowing the currents of the North Indian Ocean circulate like those of the North Atlantic; but this direction is reversed during the south-west monsoon.

Currents of the Southern Ocean.—The continuous water ring of the Southern Ocean swept by the "brave west winds" from west to east receives branches of the south-flowing currents along the east coast of each of the southern continents, and throws off northwards branches to reinforce the north-flowing currents along the west coast of each. Antarctic drift ice may occasionally be seen almost at the northern limit of this ocean, although it rarely comes into lower latitudes than 43° or 42°. About 50° S. the warm salt surface water coming from the north is cooled and freshened by mixing with the cold fresh surface water coming from the south, and the increase of density due to the fall of temperature in the one and the increase of salinity in the other, cause a vertical sinking of surface water all round the world. The deep layers of water seem then to be slowly drawn northwards and southwards from this ring to replace the surface drifts, and thus the Southern Ocean acts as a sort of "clearing house" of the hydrosphere, where all inequalities and irregularities in the water of the separate oceans are corrected.

Functions of the Ocean.—In the physical economy of the Earth

the hydrosphere plays the part of a regulator. Its smooth surface gives an opportunity for the normal system of winds to be developed over the greater part of the globe. Its thermal action carries the surplus heat of the tropics to regions less favoured by the Sun, and cools the air of low latitudes by the application of deep upwellings from the cold depths, and by ice-chilled currents from the polar seas. By the absorption and restoration of atmospheric gases it keeps up the uniform composition of the air. It is the one great reservoir of water-vapour determining the rainfall of the land, and is thus the ultimate source as well as the ultimate destination of all rivers. It is the place where the worn-out materials of the land are fashioned anew to build the rock stuffs of the future.

With regard to the plants and animals of the land the ocean is an inexorable barrier, and so it is for savage man. But the separation of the sea does not hold good for civilised humanity; the barrier has been converted into a highway, so that countries separated by five thousand miles of sea are now for all practical purposes nearer than if they were united by five thousand miles of continuous land. The fullest use of the ocean as a highway demands not only considerations of the shortest line but of the most favourable conditions. Thus the quickest sailing voyage from England to New Zealand is round the Cape of Good Hope, but the quickest sailing voyage from New Zealand to England is round Cape Horn on account of the prevailing winds and currents. Again, the shortest course from Cape Town to Melbourne cannot be taken by vessels because it would bring them too far south, into the region rendered dangerous by Antarctic ice.

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CHAPTER VII.—THE ATMOSPHERE AND CLIMATE

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Definition of Climate.—In every known part of the Earth's surface atmospheric changes are constantly going on, from day to day, from month to month, and from season to season, which are found always to keep within certain more or less definite limits, and always in the long run to maintain a certain average condition which varies so slowly that no appreciable change can be detected unless we go back to the geological past. To every place, therefore, can be assigned a certain mean atmospheric condition, and limits may be stated beyond which this mean is not departed from—the expression of this mean condition and its limits is called the *Climate* of the place. A description of climate is an account of the physical state of the atmosphere; the different physical elements become *Elements of Climate*, and climates may be analysed and classified according to the temperature, humidity, movement, &c., of the atmosphere. In the first instance, a rough classification can be based on evidence received directly from the senses, as into hot or cold, dry or damp climates, but for exact purposes comparable observations must be made by means of instruments.

Temperature.—So far as our knowledge goes, the interior of the Earth, although undoubtedly at a high temperature, contributes a negligible quantity of heat to the atmosphere, and the heat which raises the temperature of the air above that of interplanetary space is wholly derived from the Sun. The foundations of meteorology and climatology are therefore to be sought in physical astronomy.

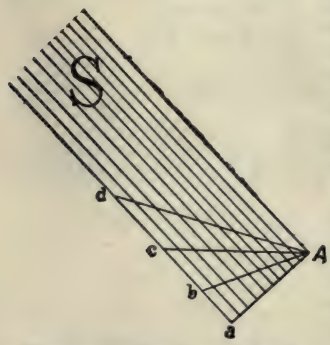

Fig. 41.—*Inclination and heating power of Solar Rays.*

Distribution of Solar Heat.—The simplest case to consider is the distribution of temperature to be expected on the surface of a globe of the same size and shape as the Earth, rotating under the same astronomical conditions, but presenting to the Sun a uniform land surface without any atmospheric envelope. The amount and intensity of the solar radiations falling upon a given area depend upon the angle at which they are received, as appears from the diagram (Fig. 41). Let S represent a bundle of parallel rays,

then Aa, Ab, Ac, Ad each receive the same total number, but Aa (perpendicular to the rays) is demonstrably shorter than Ab, Ab than Ac, Ac than Ad, and so on; that is, the greater the altitude of the Sun the greater is the intensity of the radiation received on a unit of surface. Speaking generally, the altitude of the Sun is greatest at the equator, and diminishes as the latitude increases, so that if the Sun remained always vertically over the equator (its position at the equinoxes) the amount of light and heat received at any place on the Earth's surface would be a simple function of the latitude, the length of day and night being everywhere equal. But the Sun travels over a belt extending to $23\frac{1}{2}^{\circ}$ on each side of the equator, so this simple relation is only approximately true for a few days in the year about the time of the equinoxes. Within the tropics the altitude of the Sun varies comparatively little, and beyond them it changes more and more according to the position of the Earth in its orbit.

This consideration introduces two fundamental ideas, that of *Diurnal* changes due to the Earth's rotation on its axis, and that of *Seasonal* changes due to its revolution round the Sun; and also to the fact that near the equator the diurnal influence is paramount and the seasonal influence slight, while with increasing latitude one gains and the other loses, till at the poles the seasonal influence is supreme. Fig. 42 (after Wiener) shows the daily allowance of rays from the Sun at four different dates in various latitudes of the northern hemisphere; it is noteworthy that on June 21st places north of 62° N. get more Sun the further north they are, the length of the day more than making up for the weaker intensity.

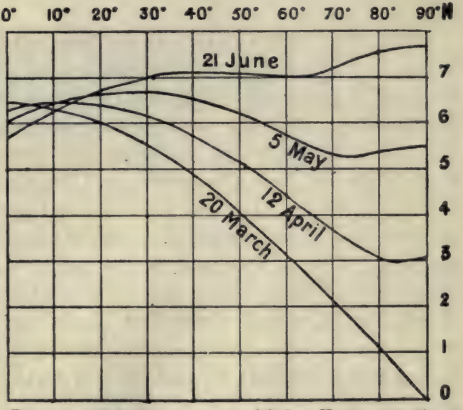

FIG. 42.—*Relative amount of Solar Heat received at each latitude at various periods.*

In the southern hemisphere, the seasons are of course reversed, and it is to be noticed that in the southern summer the intensity of the solar rays is greater than in the northern, and in the winter less; because during the southern summer the Earth is in its nearest position to the Sun (perihelion), and during the winter at its greatest distance (aphelion). This partly accounts for the intense heat of the summer days in Australia and South Africa, and generally for the greater severity of the climates of southern latitudes. At the same time it must be remembered that what the southern hemisphere gains in power it loses in time, for the Sun

remains some eight days longer in the northern hemisphere than in the southern.

These complex differences of daily distribution vary from the tropics, where the solar energy is doled out in almost equal daily portions all the year round, to the poles where there are six months' continuous supply and six months' absolute want. The following table gives the relative amounts of solar heat for intervening latitudes, and may be compared with the table of the length of daylight at the end of Chapter II. (p. 25).

Latitude	0°	15°	30°	45°	60°	75°	90°
Amount	1,000	969	879	739	569	447	415

Thus the poles, which would get nothing if the Sun remained stationary over the equator, actually receive more than 40 per cent. of the equatorial amount. The total annual supply of heat to the Earth is estimated as sufficient to melt a layer of ice covering the whole surface to a depth of 176 feet.

Since the Earth's surface is not known to become perceptibly hotter or colder, it follows that, on the whole, the energy received from the Sun must all be given out again, that the Earth must itself radiate to space, as the Sun does. But the two transactions do not occur at the same rate. In the case of the heat rays, radiation into space may be at one time faster, at another slower, than absorption, and the Earth retains at all times a certain balance of heat. The heat thus retained goes to raise the *temperature*, and the temperature at any point is simply the state of the heat account at the moment. The atmosphere is the great banker, and no more striking illustration of its influence can be given than the statement of the results of calculation, which show that while without an atmosphere the mean temperature at the Earth's surface would be 115° F., the mean temperature during the day would be 350° F., and during the night—123° F., a range of 473°.

Effects of Heat on the Atmosphere.—In passing through the atmosphere the rays of the Sun are partly absorbed, the amount reaching the Earth's surface being probably a little over half the total received at the upper limits of the atmosphere. It is obvious that the more oblique the rays, the greater the distance they have to travel through the atmosphere, hence the original differences in the intensity of insolation with high and low Sun are exaggerated. The decrease from the equator towards the poles becomes so much more rapid than before that there is no maximum of daily insolation in high latitudes, but a continuous decrease polewards. But the amount absorbed by the atmosphere varies greatly with time and place. Pure dry air or water vapour probably absorbs a very small proportion of the Sun's rays; the absorption is chiefly due to the presence of an infinity of minute suspended dust particles, which not only vary in number and size themselves, but are altered by the humidity of the atmosphere. When the amount of moisture

present is small, and the temperature high, the suspended particles of dust are dry, but when the humidity rises beyond a certain point a deposit of water takes place on them, increasing their size and absorptive power. After a certain stage the assemblages of particles become sufficiently opaque to form *clouds*, which intercept practically all the rays from the Sun on the one side, and from the Earth on the other. The atmosphere is, however, not equally opaque to all rays, it exercises a selective absorption, stopping short-wave rays to a greater extent than long-wave rays ; hence the Sun often appears red when low down on the horizon. A considerable proportion of the rays absorbed by the atmosphere ultimately reach the Earth's surface as *scattered* rays, hence the sky appears blue, shadows are not perfectly sharp, it is not always intensely cold and dark in the shade, and in the higher latitudes there is long twilight.

Effects of Heat on Land and Water.—The effect of the solar rays upon reaching any point on the Earth depends to a large extent on the nature of the surface upon which they fall. On land the heat rays are all stopped just at the surface, and a thin superficial layer of the ground is heated. The heat is then distributed by conduction downwards into the ground, and upwards to the layer of air lying immediately in contact with it. The latter is removed either by external forces causing *wind* or by *convection-currents ;* colder air takes its place, and is in turn warmed and replaced. The surface of the ground will obviously become warmed until just as much heat is lost in these two ways as is received. Much depends on the nature and condition of the surface ; dry soils, for example, such as sand, which contains imprisoned air, carry off heat more slowly than damp, close soils, and therefore become much hotter. During the night the surface of the ground loses heat by radiation, and heat is brought to it by conduction from below, the whole process being reversed, except that the layer of air cooled by contact with level ground is not now removed by convection.

Rays falling upon deep water are not all stopped at the surface, but penetrate to a depth of probably about five hundred feet, hence the surface layers do not receive as much heat as on land. Evaporation also goes on from the surface of the water, and much of the heat becomes latent. There is therefore less heat available for warming the surface of the ocean, and as the specific heat of water is much greater than that of dry land, the surface of the sea does not rise in temperature to anything like the same extent. Again, the amount of cooling by radiation is much less, and this effect is further reinforced by the cooled water becoming denser and sinking below the surface, to be replaced by warmer and lighter water from below. Several different causes thus conspire to reduce the diurnal and seasonal range of temperature over the sea as compared with the land.

Moisture.—The position of moisture as a climatic factor depends chiefly on the relation between the capacity of the atmosphere for

moisture at any time and place, and the actual amount it contains. In a *dry* climate, temperature conditions are such that the atmosphere can hold much more moisture than is available, and it greedily absorbs exposed water by evaporation. A *damp* climate may exist where no more aqueous vapour is present than in the most arid regions; the lower temperature producing an approach to saturation. In other words, it is the *relative*, and not the *absolute*, humidity that is important.

We have already indicated how the dryness or dampness of the atmosphere affects the transmission of the Sun's rays through it, and therefore modifies the temperature. The condensation of moisture in the form of *clouds* or *mist* is chiefly important in its effect on radiation and evaporation at the surface of the ground. When vapour is condensed in sufficient quantity, the cloud-particles tend to unite, and, becoming too large to remain in suspension, fall as rain, hail, or snow. All these forms are included in the general term precipitation and conventionally in *Rainfall*. The amount and distribution of the rainfall is the most important element of climate next to temperature.

The climate of some regions is seriously modified by the deposit of a persistent layer of snow on the land surface during winter. Snow is a bad conductor of heat, and it therefore serves to prevent the temperature of the ground on which it lies from falling rapidly; its surface may at the same time become exceedingly cold through radiation, cooling the layer of air resting upon it. A thick layer of snow tends to delay the advent of spring, as the temperature of the surface of the ground cannot rise above 32° F. until all the snow is melted, and meanwhile the soil has become soaked with ice-cold water.

Wind.—If the atmosphere were of uniform temperature throughout, it would so arrange itself that the pressure at any point would simply be that due to the weight of atmosphere above it, a stable condition of things would be arrived at, and all motion would cease. But there are continuously-acting causes of inequality of temperature, and differences of pressure arise from these, which in their turn produce movements of the atmosphere. The currents so produced are known as *Winds*. The general tendency necessarily is for winds to blow from areas of high pressure to areas of low pressure, but on account of the rotation of the Earth the movement is not direct; it is rather spirally outwards from areas of high pressure and inwards to areas of low pressure, the deflection being to the right of the direction of motion in the northern hemisphere, and to the left in the southern (Figs. 43, 44). The general circulation of the atmosphere is best understood from a study of charts

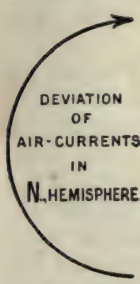

FIG. 43.

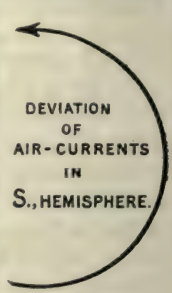

FIG. 44.

showing the average distribution of pressure by means of *isobars;* the direction of flow in the high and low areas can be easily remembered (Fig. 45). So far as is known, pressure is not itself an important element of climate, except in the case of mountain stations.

Winds exercise a paramount climatic influence from their action in transferring heat and moisture. They carry the warm air of low latitudes to the colder regions of higher, and *vice versâ*, and they break down the sharp division between the air lying over land and over sea, in one place carrying moist sea air inland, in another carrying dry air from continental regions over coastal districts to pick up vapour from the ocean. At sea, the winds have additional heat-transferring powers from their dragging action on the surface waters, which gives rise to drift-currents,

FIG. 45.—*Average distribution of Atmospheric Pressure, and prevailing Winds of the Earth.*

following the winds, and carrying vast quantities of heat with them as they flow poleward. Winds have also great influence in promoting evaporation, removing the saturated layers of air at the water surfaces, and substituting drier air, which in turn becomes saturated.

The Great Climatic Areas.—It will be readily understood that in every part of the globe local variations of climate, due to changes in the relations of the principal elements, occur with such endless complexity that it is impossible to give any general description which shall apply rigorously to any particular region. It is nevertheless possible to assign fairly definite limits to certain areas over which the conditions are more or less similar ; and a knowledge of the general features of climate within these areas is essential to proper comprehension of the conditions found

within any part of them, such as are described under the headings of different countries.

The simple division of the Earth's surface into Torrid, Temperate, and Frigid Zones, follows naturally from the ideal temperature conditions already considered. The rotation of the Earth has, however, such a profound modifying influence on the circulation originally set up by differences of temperature that it is better to base a division into climatic areas on the existing circulation itself, or rather on the distribution of pressure which is its more immediate cause.

The Earth is at all seasons completely surrounded by two belts of high atmospheric pressure, one lying in about latitude 35° N., the other in about latitude 30° S. On the equatorial sides of these belts pressure diminishes to a minimum near the equator, and on the polar sides a similar diminution occurs, extending to very high latitudes, if not to the poles. The circulation arising from this distribution of pressure may be summarised as follows :—

Equatorial Belt	Calms and variable winds ..	"Doldrums."
N. Intermediate Belt	N.-E. and E. winds	"Trades."
S. Intermediate Belt	S.-E. and E. winds	
N. and S. High Pressure Belts	Calms and variables.. ..	"Horse latitudes."
Higher North Latitudes ..	Variable W. and S.-W. winds	"Westerly variables."
Higher South Latitudes ..	Strong W. and N.-W. winds	"Brave west winds."

The position of all these belts changes with the season ; but the range of movement is comparatively small, and the extreme positions are reached from one to two months after the solstices. In the Atlantic, for example, the north-east trade winds extend from latitude 3° N. to 26° N. in March, and from 11° N. to 35° N. in September. When the equatorial calm belt moves more than a few degrees from the geographical equator, the trade winds from the opposite hemisphere are drawn across and deflected so as to have a westerly component, and they then receive the name of *Monsoons.* A south-west monsoon prevails in the Pacific north of the equator during the northern summer, and a north-west monsoon in the Indian Ocean south of the equator during the southern summer.

If the Earth presented a surface entirely covered by water, the bounding lines of these climatic belts would probably exactly follow parallels of latitude round the whole circumference. This typical arrangement is always developed over the great oceans, and most perfectly in regions farthest removed from land influences. The *Equatorial Belt* is remarkable for its sultry, humid atmosphere, its constant and copious rains, and for the strongly marked diurnal, as contrasted with seasonal, changes. In the *Trade-wind Belts* the air is dry, because it is moving from colder to warmer latitudes and cannot pick up moisture fast enough to maintain saturation, and the rainfall is light ; these regions are remarkable for the steadiness of their winds and for the strong evaporation from the surface of the sea, producing great saltness of the surface waters. The *Horse Latitudes*

resemble the equatorial belt in their light, variable winds and frequent calms, but present a marked contrast in the dryness and freshness of the air and the light rainfall. Where the *Westerly Winds* of higher latitudes prevail the rainfall is chiefly associated with irregular, stormy disturbances or eddies in the general flow known as *cyclones*, which usually follow the course of the main current, and occur most frequently in winter. In the intermediate regions, between the limits of migration of the various belts, marked seasonal variations come into play, the climatic belt nearer the equator assuming control during the summer, and that nearer the pole in winter : amongst the districts affected in this way, particularly as regards wet and dry seasons, the countries round the Mediterranean, South Africa, southern Australia, parts of Chile, and the West Indies may be specially mentioned.

Influence of the Land.—The chief modification of the normal climatic arrangement produced by the presence of the great land surfaces is due to the greater range of temperature. The air on the land surface is, on the whole, hotter than the air on the sea during summer, and colder in winter ; hence pressure tends to be relatively greater in winter and less in summer, and there is a general movement seawards in the former season and landwards in the latter. A kind of monsoon effect is thus produced, alternately weakening and reinforcing the normal circulation, and its action in deflecting the normal currents is apparent on all the continental coasts, notably in Africa and in Australia. In the case of India and south-eastern Asia, the vastness of the continental surface, combined with its great central elevation, produces a complete reversal of the normal conditions during summer, the south-east trades are drawn across the equator, and penetrate inland as the south-west monsoon, a strong, warm wind bearing immense quantities of moisture. During winter, the outflow from the excessively cold regions of Central Asia strengthens the north-east trade over India, and deflects it into a north-west wind over China and south-eastern Asia, the wind usually getting the name of the winter monsoon. These seasonal winds are by far the most important of the continental winds, and the "monsoon region" over which they blow forms a distinct geographical area by itself.

Analogous to the seasonal changes, a diurnal change occurs on the coasts of regions where the diurnal range of temperature is great. These are known as *Land and Sea Breezes*. When the winds due to the general circulation are not powerful, a wind blows landwards during the hotter hours of the day, and seawards during the night ; but if they blow with considerable force, as in the trade-wind belts, the diurnal influence merely shows itself by weakening and strengthening, or deflecting, the normal current.

Influence of Vertical Relief.—In addition to the temperature disturbances produced by the land masses, modifications in the

distribution of moisture must be taken into account, and in this connection the *Relief* of the land surface is specially important. When a current of moist air moves inland from the sea, its supply of vapour is cut off. If it is now warmed, as in moving from higher to lower latitudes, the air becomes dry, and the country over which it passes has an *arid* climate. This is best seen in the desert plains of the trade-wind region—in Arabia, Persia, the Sahara, and Central Australia. But if, on the other hand, the air is cooled, it is unable to retain all its moisture, part of which is deposited as rain. Such cooling can take place in a number of ways, but by far the most common and most effective is by the air ascending from lower to higher levels of the atmosphere. There are two main causes which give rise to such ascending movements, the formation of eddies or cyclones, and the forcing up of the air by direct contact with elevated land. The two causes differ in respect that the latter necessarily operates only on land, and is a definite fixed element, while the other is most effective at sea, and is an erratic and uncertain quantity at all times. Probably most land stations owe their yearly total of rainfall to both causes combined, but the cyclonic agency is much the less important between the horse latitudes, and much the more important beyond them.

A current of air meeting a range of mountains accordingly deposits a heavy rainfall on the weather side. The condensation sets free latent heat, which prevents the rapid cooling of the air and encourages its further ascent, at the same time drawing up more air from below. The enormous rainfall of the monsoon area is largely due to the height and continuity of the mountain mass of the Himalaya, and the trade-winds, drawn inwards and deflected by the great range of the Andes, distribute a generous rainfall over Brazil.

After crossing a range, the current of air may pass on as dry wind, or if the range is sufficiently high it may disappear from the surface circulation altogether. In either case, the lee-side of the range is distinguished by a dry and often an arid climate : if the air is drawn downwards into valleys from the heights it becomes heated by compression, producing the Föhn or Chinook winds of the northern valleys of the Alps and the eastern side of the Rocky Mountains. A range of hills does not in all respects act like a lofty range of mountains; but when the height does not reach the snow-line the maximum rainfall occurs a little to leeward of the crest over which the wind blows.

From the direction of the prevailing winds, it follows that between the horse latitudes dry regions are found towards the western sides of the land masses, as in Mexico and Chile, while in the westerly-wind belts they occur towards the east, as in Central Asia, the region of the Great Basin in the United States, and the south of South America. When the region is not actually desert, a large proportion of the rainfall is often due to merely local disturbances of the thunderstorm type, as in the eastern

counties of England, where August is the wettest month of the year. It may be well to point out here the immense advantage enjoyed by Europe through the absence of a high mountain range near the western margin ; the moisture of the Atlantic penetrates to a great distance eastward, and is distributed in moderate rainfall over a large area.

Mountain Climates.—Climate changes with increase of height above sea-level in much the same way as with increase of latitude, except that the radiation effects become stronger, as the rays do not pass through so great a thickness of atmosphere. Generally speaking, temperature and absolute humidity diminish as height increases, and rainfall becomes greater up to a certain level ; relative humidity shows no very regular variation. Everything, however, depends on the form of the elevated surface ; a level plain retains the same characteristics of climate through a wide range of elevation, while the climate of a sloping mountain-side is modified by the ascending and descending currents of air. Ascending currents of course tend to discharge moisture, while descending currents are usually caused by cold air sliding downwards into valleys below : the double effect diminishes the range of temperature, and produces a climate approximating to the "oceanic" as opposed to the "continental" type.

Climates of High Latitudes and Polar Regions.—The normal decrease of temperature from the equator to the poles should produce a gradual increase of pressure in that direction, but the rapid movement of air in the belts of westerly winds, of which the poles are the centres, induces a centrifugal tendency which would make pressure greatest at the outer margins of the rotating rings (*i.e.*, in the horse latitudes), and less and less towards their central points. Hence the normal temperature gradient and the centrifugal forces are constantly acting against one another, and the former is helped at the expense of the latter by the resistance offered to the westerly currents by temperature disturbances and by friction, both of which are greatest on a surface of land or rough ice, and least on the open sea.

The northern polar area consists of an ice-covered ocean almost entirely surrounded by land. The only considerable tract of water is the extension of the North Atlantic, known as the Norwegian Sea, and the prevailing westerly winds accordingly reach their highest development in the northern hemisphere in this region, assisting themselves further by the drift currents, which the configuration of the land allows them to push far to the north. Elsewhere, land and ice surfaces neutralise the centrifugal element and sometimes overcome it altogether ; winds are light and variable, stormy weather is comparatively rare, and there is a small rainfall.

In high southern latitudes, the uninterrupted belt of the Southern Ocean allows the "circum-polar eddy" to have full play until the coasts of the Antarctic continent are approached. Pressure falls continuously, and

strong westerly winds are met with up to about 60° S. latitude. Beyond this there are indications that a polar cap of land and ice neutralises or reverses the arrangement, perhaps more completely than is the case in the north as the winds in the neighbourhood of the Antarctic circle blow most frequently from an easterly quarter, indicating an increase of pressure towards the south.

Climate Diagrams.[1]—In Part II. many diagrams are given (*e.g.*, Figs. 59, 60) showing the distribution throughout the year of rainfall and atmospheric temperature. The seasonal range of these elements is of even greater importance than the mean annual values. In each case the temperature curves and rainfall columns of two places, the situation of which accounts for their difference of climate, are given for comparison. Thus the contrast of continental and oceanic climates is shown in Fig. 95, and that of rainfall during a prevailing sea-wind and land-wind respectively in Fig. 244. The difference in seasonal distribution of temperature between the northern and southern hemispheres may be appreciated by comparing Figs. 196 and 313.

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For notes on climate of special regions in all parts of the world, see the *Meteorologische Zeitschrift*, published monthly in Vienna; the *Quarterly Journal* of the Royal Meteorological Society; the *Journal* of the Scottish Meteorological Society; for the British Empire see *Symons's Meteorological Magazine*, published monthly in London; for the British Isles, the *Weekly Weather Report* of the Meteorological Office, London; and for North America, the *Monthly Weather Review* of the United States Weather Bureau.

[1] By the Editor.

CHAPTER VIII.—THE DISTRIBUTION OF LIVING CREATURES

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The Main Problem.—The main problem in the study of the geographical distribution of plants and animals is to explain the existing state of affairs, and to obtain answers to such questions as these :—Why are certain forms of life here and not there, there and not here? Why is it that all the Marsupials except the American opossums are now restricted to Australasia? Why are there no Amphibians on oceanic islands? How does it come about that several species of Tapir occur in South and Central America and the only other one in the far distant Malayan region? Why is the flora of the Steppes such as it is? Why are certain regions treeless and others grassless? How is it that the same Alpine plants are found on widely separated mountains and not in the intermediate areas? Why is there a striking contrast between the flora of New Zealand and that of Australia? Some of these questions may be answered readily, others are very difficult, but they are all of the same general nature—they concern *the factors which determine distribution.* To analyse out these factors is the main problem; and the difficulty of the subject is due to the fact that in most cases an observed state of affairs is the result of numerous co-operative factors, all variable, and all inadequately known. Many of the pre-Darwinian studies in distribution are vitiated by their insistence on one or two factors to the exclusion of others which are certainly operative. Some investigators insisted on physical boundaries, others on conditions of climate, others on means of dispersal, and so on; but there can be no solution of the problem until all the factors are recognised, and recognised as co-operative.

Peculiarity of Physical Conditions.—Apart from a few resting-stages of Algæ, and a few micro-organisms whose precise position is uncertain, there are no plants in the Deep Sea. Their absence is sufficiently explained when we remember that one of the physical conditions of the great abysses is darkness, broken only by the fitful gleams of "phosphorescent" animals, and that for all plants except Fungi and some parasites, light is an essential condition of life. The Great Salt Lake of Utah has an extraordinarily high salinity; this physical fact is enough to explain why it contains only two or three animals, especially the brine-shrimp, *Artemia fertilis,* instead of the dense population usually found in lakes.

Peculiarity of the Organism's Constitution.—While some

animals, like the flounder, salmon, and eel, can adjust themselves to fresh or salt water, there are others which are fatally sensitive to more than a minimum of salt. This is strikingly true of Amphibians, which absorb large quantities of water through their skin, and are killed at once if the water be salt. This constitutional peculiarity of the Amphibian race is obviously enough to explain why they are absent from oceanic islands. While some animals seem very indifferent to temperature, like the tiger, which ranges from the hot Malayan jungle to the icy Siberian tundras, there are many of more sensitive constitution. Thus the guanaco, the South American relative of the camel, cannot stand tropical heat; therefore in Peru and Ecuador it is only found many thousands of feet up the mountains, while further south in Argentina it occurs on the plains.

The Means of Dispersal.—On a solitary island of volcanic origin there are rarely any mammals, and this is at once explicable when we remember that most mammals have very limited powers of swimming. There may be seals or porpoises about the shore, or bats in the caves, and their presence is as intelligible as the absence of others. The occasional occurrence of small rodents on such an island is usually explained by postulating a wreck or a drifting raft.

What is called a cosmopolitan distribution is not always due to the same cause, but the broad fact may be noted that wide distribution is *often* associated with unusual facilities for dispersal. Thus mice, so readily concealed, have followed man's wanderings everywhere. Thus, too, we may explain the fact that insects are represented almost everywhere; most can fly, many are easily drifted with the wind, some occur about floating wood, or can be carried from place to place in the form of eggs or cocoons.

Original Headquarters.—If it were, and had always been, the case that the body of a dead animal simply melted away, like the stranded jelly-fish on the beach, we should now be entirely ignorant as to the original headquarters of the different races. If, on the other hand, there had been any arrangement whereby representative samples of the faunas of successive geological ages could have been preserved in the rocks, we should have certain evidence on this point. But what has actually happened lies between these two extreme possibilities. There *is* a geological record ir the fossil-bearing rocks, the graveyards of the buried past; but this geological record is very imperfect. The imperfection is explained partly by the softness or rapid decay of many animals and plants, partly because many of the rocks which might have contained fossils have been fused, metamorphosed, or worn down again into dust, and partly by other reasons. The record is like a library in which whole shelves have been destroyed by fire, while others are left in disorder, in which most of the sets of volumes are incomplete and most of the individual books are sadly damaged. At the same time, there *is* a record, the study of which gives us some warrant for speaking of original headquarters or evolution-centres. It seems fairly certain from geological evidence that the northern

hemisphere was the original home of most Mammals, whence they have spread southwards ; that the Edentates (sloths, ant-eaters, and armadillos) had their evolution-centre in South America ; that Africa is the headquarters of the legions of antelopes ; that there were never any Anthropoid Apes in the New World, nor any Mammals higher that Marsupials indigenous in Australia ; and that Madagascar was the headquarters of the race of lemurs.

Geological Conditions.—There is no more impressive fact concerning biological distribution than "Wallace's Line" (Fig. 280), which perpetuates the name of one of the most successful workers on the subject. This line follows the narrow but *deep* strait which separates the islands of Bali and Lombok, and is continued northward along the Makassar Strait between Borneo and Celebes. Soundings show that the strait is deeper than those which separate the other Malayan islands, and this physical fact becomes significant when we learn of the diversity of the fauna on either side of the line. There seems no doubt that we have here to do with an old-established geological barrier to dispersal.

Even the scanty geological information which we possess, corroborated by soundings which show the shallowness of the sea, make it practically certain that at no very remote date Asia was connected with America by a land-bridge across Bering Strait. This fact enables us at once to understand the presence of remains of the horse, bison, and mammoth in Alaska, and to understand better the many common features between the Eurasian and the North American faunas.

Bionomic Relations.—The presence or absence of particular plants or animals in a given region may be sufficiently accounted for by the factors already mentioned, or even by one or two of them, but where the geological evidence shows that organisms once inhabited a region in which they are no longer found, we must fall back for explanation on that large phrase, "the struggle for existence." This includes all the more or less critical responses which living creatures make to changes in their environment, both inanimate and animate. Changes in the inanimate environment, *e.g.*, floods, lava-flows, slow alterations of climate, equally slow crust-movements, may decide the question of survival ; and so may the very important factor of intra-organismal struggle. On a Scottish hillside we may watch from year to year the silent struggle between bracken and grass ; the same struggle, though different in intensity, is characteristic of the tropical forest. Such well-known cases as the struggle between quickly-breeding "vermin," *e.g.*, voles, and the beasts and birds of prey, are merely striking illustrations of a universal process. Often a balance is struck and both parties manage to survive, doubtless after a process of mutual adaptation ; often, however, there is a meeting of incompatibles, thus we do not find horses and tsetse flies flourishing together. Not less important is the struggle between plants and animals ; the leaf-cutting ants have played their part in determining what trees can

survive in the Brazilian forest, and it is obvious that a parish rich in cornfields with cleanly kept hedges, and poor in woods or meadowland is not likely to be favoured by insects which live on nectar.

Summary as to the Factors in Distribution.—At least six main factors have contributed to the present distribution of organisms, and none of these can be ignored. They may be grouped in pairs :—(*a*) The physical peculiarities of the region under discussion, and the constitutional peculiarities of the living creatures ; (*b*) the original headquarters of the stock (usually uncertain), and the means of dispersal in each case ; (*c*) the physical changes of climate, Earth-movements, &c., in the region, and the changes brought about in the struggle for existence between the various living tenants of the country. It may even be permissible to use a mathematical expression, and say that the distribution is a function of six factors, some of which are variable dependently and others independently.

But besides the six main factors there are minor ones, and the problem becomes very complex. Thus although man has not lived long upon the Earth compared with many other living creatures, he has been the direct cause of enormous changes in their distribution ; such as the introduction of rabbits in Australia, sparrows in America, and the practical extermination of the bison and the beaver. One of the most curious extensions of the life area of a species is the spread of the jigger, a South American insect, which passes its early stages of development as a parasite in the feet of men. It was accidentally introduced into West Africa in 1871, was gradually spread eastward by the increase of traffic across Africa, and in 1898 appeared for the first time in Zanzibar.

Some Elementary Facts as to Distribution.—(*a*) Widely separated countries may have similar fauna and flora. Dr. Wallace begins his *Island Life* by supposing a traveller to pass from Great Britain to Northern Japan. "He is now separated from his starting-point by the whole width of Europe and Northern Asia, by an almost endless succession of plains and mountains, arid deserts, or icy plateaux, yet when he visits the interior of the country he sees so many familiar natural objects that he can hardly help fancying he is close to his home." . . . "There are also, of course, many birds and insects which are quite new and peculiar, but these are by no means so numerous and conspicuous as to remove the general impression of a wonderful resemblance between the productions of such remote islands as Britain and Jesso."

(*b*) Closely adjacent countries may have quite different faunas and floras. Thus, as Dr. Wallace points out, the distance from Australia to New Zealand is trivial when compared with that between Britain and Japan, but the Australian who journeys to New Zealand finds an entirely new living panorama. "Kangaroos and wombats there are none, the birds are almost all entirely new, insects are very scarce and quite unlike the handsome or strange Australian forms, while even the vegetation is all changed, and no gum-tree, or wattle, or grass-tree meets the traveller's

eye." An even more striking case is the contrast between the islands of Bali and Lombok, in the Malay Archipelago, and the same fact is illustrated by the contrast both in fauna and flora between Florida and the Bahamas.

(*c*) Regions with very distinctive tenantry are in many cases connected by transition areas. Prof. Heilprin illustrates this by supposing the naturalist to journey southwards from the ice-covered fields of Arctic America to the Equator. "New features are being constantly added, and old ones eliminated, but the interchange is effected so gradually that it becomes difficult to determine the limitations that properly define one fauna from another." Yet the fauna at the end of the journey is sharply contrasted with that which surrounded the traveller at its beginning.

(*d*) On the other hand there is no lack of instances which show sharp delimitation. The mammalian fauna of Australia, apart from recent imports (*e.g.*, rabbits), the bat-tribe, and marine forms, consists wholly of Marsupials and Monotremes; with the possible exception of the dingo, there are not even fossil remains of Mammals higher than Marsupials; and, furthermore, there are now no Marsupials beyond Australasian limits except the family of American opossums.

(*e*) Another striking fact is the "discontinuous distribution" of certain types, by which we mean that examples of a type may occur in widely separated regions without there being any living representatives in the intermediate areas. The generally applicable explanation is that the type in question once enjoyed a wide distribution, as the rock records show; that widespread elimination has occurred; and that the conditions favourable to survival happen to have been found in areas far apart from one another. Thus of the genus Tapir, there are some four species in South and Central America, while the only other species occurs in Malacca and Borneo. Similarly the family of Camelidæ is represented by one genus in the Old World and another in South America; and the insectivorous Centetidæ are represented by five genera in Madagascar, and one in Cuba and Hayti.

These five sets of facts must serve to illustrate what may be called the elementary data of distribution.

Zoo-Geographical Regions.—In 1858, Dr. P. L. Sclater proposed to recognise six main zoological regions:—(1) *Palæarctic* (=Europe, Northern Africa, Northern and Central Asia); (2) *Ethiopian* (=Africa south of the Atlas, and Madagascar); (3) *Indian* or *Oriental* (=India, South-Eastern Asia, and part of the Malay Archipelago); (4) *Australian* (=Australia, with New Guinea, New Zealand, and Polynesia); (5) *Nearctic* (=America as far south as Mexico); and (6) *Neotropical* (=Central and South America, and the West Indies). This scheme was mainly based on a study of the distribution of birds, but Dr. A. R. Wallace soon showed that it worked well for mammals also, and it has met with wide acceptance. Among the more important emendations which have been suggested are the following:—(*a*) the union of Palæarctic and Nearctic in one Holarctic region; (*b*) the

establishment of several other special regions, *e.g.*, Polynesian, Hawaiian, Malagasy, Sonoran or Medio-Columbian, Arctic, and Antarctic; (*c*) the definition of several transition-areas, *e.g.*, around the Mediterranean and Lower California; and (*d*) the grouping of the regions in three major realms which correspond to the three great evolutionary centres of mammals—I. The *Notogæic* Realm (including Australian, Polynesian, Hawaiian, and Australo-Malayan regions); II. The *Neogæic* Realm (including the Neotropical region); and III. The *Arctogæic* Realm (including the Malagasy, Ethiopian, Oriental, Holarctic, and Sonoran regions).

Phyto-Geographical Regions.—In spite of enormous labour spent upon the subject, it remains quite undecided what topographical and other divisions may be most profitably used in grouping plants according to their past and present distribution. When the plants of the world are known as thoroughly as those in Europe, and when the factors of distribution throughout Europe have been as carefully analysed as they have been for Great Britain, then the question whether we should recognise fifteen or twenty-five or thirty-five floral regions will begin to be answerable.

Humboldt relied mainly on latitude and longitude and height above sea-level in his pioneer attempt to group plants geographically; and in this he was followed by Meyen. Schouw (1823) introduced the statistical method, characterising his proposed twenty-five regions by the numerical predominance of certain races of plants, *e.g.*, the "Magnolia region," the "Cinchona region," and so on. Grisebach (1872) recognised twenty-four areas, and laid particular emphasis on the topographical and climatic barriers which separate one area from another. Engler (1882) struck a new note in seeking to relate the present distribution of plants to that in Tertiary times. Drude (1884) followed on similar lines, and sought to combine a recognition of all the factors. His system is very widely used; it recognises three main divisions:—Boreal, Austral, and Tropical, and fourteen smaller regions, each again divisible.

Until the subject is further advanced, it seems most profitable for the teacher and student endeavouring to understand the nature of plant distribution (*a*) to think out the problem in relation to the nearest well-marked area—Great Britain, Ireland, New Zealand, &c.; and (*b*) to gain by means of photographs and pictures concrete impressions of the vegetation in different parts of the Earth.

Groups of Land-Plants.—Every traveller has noticed that the same or similar plants tend to occur in similar areas, and the field-botanist can confirm this in his more restricted rambles. Wood and heath, links and shore, moor and bog, are more or less distinctly marked, wherever they are, by plants characteristic of each. Two arid shores a thousand miles apart *may* show identical or nearly related plants, and even if there be little structural affinity in the actual tenants, there is likely to be a superficial resemblance brought about by similar adaptations to similar

environment. Thus, the prickly cactuses which predominate in one arid region may be represented by similar, but in reality very different prickly spurges in another area with similar conditions. Similarly, the ornithologist expects to find wading and swimming birds about a lake, whether it be African or South American, but it does not follow that the birds will be the same in the two cases. In short, what are called "characteristic vegetations," are in many cases only what the biologist calls physiological or adaptive groups. They owe their similarity to the fact that, in given conditions, only plants of a certain constitution or with certain adaptations are able to survive. A few examples of the more typical groups may be given.

The *Tundra*, of north-eastern Europe and northern Siberia, where the deeper strata of the soil remain frozen perpetually, is characterised by lichens, like the "reindeer-moss" (*Cladonia rangifera*), and by mosses, such as species of *Polytrichum*, *Dicranum*, and *Sphagnum*. In more propitious places, however, there may be bulbous plants, dwarf willows, and grasses; and in spring, the monotony of the so-called "barren-grounds" is sometimes broken by short-lived brilliant blossoming. In fact, the tundra passes into the *Moor*, with its mosses, grasses, sedges, cranberries, and occasional willows, and birches, or into the *Bog*, with its bog-myrtle and peat, cotton-sedge and asphodel, grass of Parnassus and bog-pimpernel, and more thoroughly aquatic forms like bladderwort and marestail. Similarly, the dry tundra is connected through the moor with the well-defined *Heaths* where almost nothing will grow but heather.

The *Grassy Vegetations*, such as meadow-lands and savannas, are characterised by the predominance of grasses and sedges, whose long parallel leaves are well suited for crowded life. It is obvious that part of the problem of civilisation is the establishment, extension, and intensive culture of these grassy vegetations, which include our cornfields. But these again in some of their forms pass into the *Steppe Vegetation*, characterised by plants which are able to survive a prolonged summer drought and require a very short vegetative period. Thus trees are practically absent, and there is an abundance of "Xerophytes," *i.e.*, plants adapted to withstand great dryness. The Thyrsa-grasses (species of *Stipa*, &c.) are characteristic of the South Russian steppe; the goose-foots (*Chenopodiaceæ*) abound in the salt-steppes. The prairies of North America are probably the richest of the steppe-vegetations, and are by no means treeless, while the pampas of South America and the grassy plains of Australia repeat similar characteristics.

Woods and Forests extend in suitable places from the equator to the northern and southern climatic tree-limits, the essential condition of their occurrence being that the average temperature during the vegetative period of the year does not fall below 46° F. But the variety in the component trees and in the undergrowth is very great, as is evident when we compare the Equatorial forests, the Indian jungle, the Savanna woods of

Brazil, the pine-forests of the north, the park-lands of the Amur, and the rich green woods in sheltered English valleys.

Groups of Land Animals.—As with terrestrial plants, so with land animals, an arrangement into physiological or adaptive groups may be readily made, and if its limitations are recognised it serves a definite intelligible purpose. Thus we may distinguish, for example, a Boreal group, in some marked way adapted to the exigencies of an Arctic environment, *e.g.*, by permanent or seasonal whiteness as in the polar bear, Greenland falcon, snowy owl, Arctic fox, Hudson's Bay lemming, and Arctic hare. Other groups may, in like manner, be identified with other specialised regions. In books like Brehm's "From North Pole to Equator" ample materials will be found for what may be called impressionist pictures of the adaptive peculiarities of the various groups of animals which frequent steppe and tundra, desert and forest, Alps and river-banks.

Pelagic Animals and Plants.—While life is almost universally distributed over the Earth, wherever there is food, air, moisture, heat, and some light, it is possible and profitable to distinguish various kinds of habitats whose conditions make them in some measure discontinuous. Such are the Open Sea, the Shores, the Deep Sea, the Fresh Waters, and the Dry Land, each of which is tenanted by characteristic forms of life.

The term *pelagic* is applied to all organisms that habitually live in the open sea, either drifting (Plankton) or actively swimming (Nekton). As regards animals, there is great variety of type, from the minute *Noctiluca* which sets the waves aglow in the short summer darkness to the giants of modern times—the whales. As regards plants, there are almost none above the level of unicellular Algæ, *e.g.*, Diatoms, but of these there are immense numbers both of species and individuals. This is a fact of fundamental importance, since these minute plants furnish the basal food supply of all pelagic animals. Just as we may say of land animals that "all flesh is grass," so we may say of marine forms that "all fish is diatom."

The pelagic animals include a few genera of Foraminifera, rich in species, all the Radiolarians, many Infusorians, jellyfishes, Siphonophora like the Portuguese man-of-war, Ctenophores like Venus's girdle, many worm-types such as the arrow-worm (*Sagitta*), Chætopods, a legion of Crustaceans, a few Insects (Halobatidæ), such Molluscs as Pteropods Heteropods, many Cephalopods, free-swimming Tunicates such as *Salpa* and *Pyrosoma*, many fishes, a few turtles and snakes, besides some well-known birds and mammals. It should also be noted that many of the shore animals have pelagic larvæ. The life-conditions of the open sea are favourable; there is no lack of room, of moisture, or of sunshine, and the rapidly multiplying small forms supply abundant food for the larger. The rock records bear witness to the early origin of pelagic life.

In adaptation to their habitat, pelagic animals tend to be lightly built, delicate, translucent, and often bluish in colour, and with external organs suited for drifting and swimming. The frequent "phosphorescence" is

probably in some cases protective, but its meaning is still very uncertain. Huge numbers of individuals usually appear in shoals, which is explained partly by the abundant food supply afforded by the Algæ, partly by the prolific reproduction common among lowly organised animals, partly by the relative mildness of the competitive element in the struggle for existence, and partly by physical conditions of currents and the like, which determine areas of comfortable subsistence and routes of migration. While certain types are very widely represented, there is also a local distribution of species which shows that the pathless sea has zones and boundaries like the dry land. There are two theories of the origin of pelagic forms, one regarding them as on the whole primitive, the other as mainly due to migration from the shores.

The Littoral Area.—This area includes (*a*) the shore in the popular sense, with its heterogeneous jetsam of dead seaweeds and animal remains, and its own characteristic tenantry of sandhoppers and salt-worts; (*b*) the strict littoral zone, exposed only at low tide, with its acorn-shells, periwinkles and limpets, green seaweeds and occasional sea-grasses; (*c*) the Laminarian zone (to 15 fathoms), where the great pennon-like seaweeds float amid an extraordinarily keen battle for life; and (*d*) the Coralline zone (15–40 fathoms) where seaweeds become gradually sparser, though the population of *débris*-eating and carnivorous animals is even denser.

The conditions of shore-life are perhaps the most stimulating in the world. It is the meeting place of air, water, and land. It is the area of vicissitudes—ebb and flow of tides, freshwater floods and drought under the hot sun, gently lapping waves and violent breakers, slow changes of subsidence and upheaval. The alternations of day and night, of summer and winter, are more felt there than in the open sea. The tenantry is correspondingly rich and various, including representatives of almost every family from the Infusorians up to birds and an occasional mammal.

The rock records show decisively that the shore fauna was of very ancient origin, and there is some evidence to warrant the conclusion maintained by some (*e.g.*, Pleffer), that a very uniform shore-fauna persisted until Tertiary times. As to its origin, there are two main theories, that which regards it as in the main primitive, and that which regards it as in great part due to migrations from the open sea.

The Abyssal Area.—It is not likely that the floor of the deep sea will ever become a familiar hunting ground to the naturalist, yet almost every year since the days of the *Challenger* has added some interesting detail to our darkly-shaded picture of it. We know that there is practically no depth-limit to the distribution of animals, though plants are almost unknown below the so-called light-limit, and the more moderate depths seem to be more richly peopled.

The population of the deep sea includes representatives of most of the types of animals from Protozoa up to Fishes. There are Foraminifera in abundance, many flinty sponges, some corals and sea-anemones, not a

few Annelids and other worms, especially on the red clay, Echinoderms of every kind, legions of Crustaceans, abundant Molluscs, and many peculiar fishes—the tyrants of that dark world—some blind, some half-blind, and others with "darkness-eyes," catching perchance the fitful gleams of phosphorescence.

The conditions of life in the Abyssal area are peculiar to itself in the following particulars :—(1) There is practically no light apart from that produced by phosphorescence ; (2) the temperature is low (about 34° F.), and very uniform ; (3) it is an area of enormous pressure, thus at 2,500 fathoms the pressure is about two and a half tons per square inch ; (4) it is quite calm, untouched by the severest storms ; (5) the water is relatively rich in oxygen ; (6) it is virtually plantless ; (7) it is probably without putrescence, for although pelagic bacteria (formerly denied) are now well known, there is no secure evidence of their presence in the great depths, and there can be no true rotting without bacteria ; (8) the animals necessarily feed upon one another, but fundamentally upon the organic *débris* which sinks from above, and not least upon the ceaseless rain of pelagic Protozoa ; (9) it is very uniform over vast areas, and many forms have a very wide range.

The generally accepted view is that the deep sea did not become a possible home of life until perhaps Cretaceous times, until the Poles cooled and the cold water rich in oxygen sank to the great depths. The affinity between abyssal animals and those found in shallower water in boreal seas has often been pointed out, and it is probable that the deep sea was largely peopled from the poles, or in any case from the shores.

The Fresh Waters.—As in the case of the sea, it seems useful to distinguish (*a*) the *littoral* forms, which occur in rivers, on the shores of lakes, and in shallow water ; (*b*) the *surface* forms, or Limnoplankton ; and (*c*) the *deepwater* forms. Thus among plants, the rushes, irises, marsh marigolds, water buttercups, water-lilies, bladderworts, stoneworts are characteristically littoral ; numerous green algæ occur in the open water and form an important source of food to animals ; while few are known to occur on the floor of deep lakes. Among animals, the deepwater forms are chiefly Rhizopods, Turbellarians, Nematodes, Leeches, Chætopods, Crustaceans, a few Arachnids, some insect larvæ, and not a few Molluscs. Many have probably migrated from the shore of the lake, where the same or similar forms may also occur, along with others distinctively littoral, *e.g.*, the Hydra and the freshwater sponges. Very distinct, again, are the surface forms—small Crustaceans, Rotifers, Infusorians, &c.—which present a marked analogy of structure and habit with the marine Plankton. The Entomostracan Crustaceans are of much practical importance in forming the fundamental food supply of many freshwater fishes.

As regards origin, freshwater animals have been divided into three sets. (*a*) The *recent migrants* which may be illustrated by the dozen or more marine species which are at present learning to live in the Kaiser-Wilhelm

canal in which the water is on the whole fresh, or by the simple polype *Cordylophora* which has been carried by boats up rivers and canals. It is probable that the American freshwater polype *Microhydra ryderi* which liberates swimming-bells or medusoids is a relatively recent migrant.

(*b*) The *archaic* freshwater animals, which must have been at home in freshwater since ancient times and have been isolated by Earth-movements in basins far from the present-day sea, may be illustrated by the African freshwater Medusoid (*Limnocodium*) which was found in Lake Tanganyika, 2,700 feet above sea-level. The widely distributed old-fashioned Crustacean *Apus*, and the double-breathing mud-fishes (*Ceratodus* in Queensland rivers, *Protopterus* in the Gambia, and *Lepidosiren* in the Amazon), are other instances. In Lake Tanganyika, according to Moore, two faunas co-exist—(1) "The normal and ubiquitous freshwater stock"; and (2) a series of very divergent forms, notably molluscs, which appear to be "the dwarfed and stunted remnant of a fauna that the sea left behind it" probably as far back as the Jurassic period.

(*c*) The *cosmopolitan forms* include some Protozoa, freshwater sponges, Hydra, some Turbellarian worms, and numerous small Crustaceans, like *Cyclops*. Their uniformity seems to be due to three or four factors—(1) Migration from the sea would be effected in different parts of the world by animals of similar constitution, and the conditions of adaptation and survival, being closely alike in different freshwater basins, would tend to work out similar results; (2) in lakes which arose as relict-seas and contained originally somewhat similar samples of a fairly uniform pelagic fauna, *e.g.*, before Cretaceous times, the conditions of elimination would tend to be much the same everywhere, and the result would be uniformity in the survivors; (3) there are not a few of the smaller forms which are readily carried on birds' feet and otherwise from one water basin to another.

Dry Land.—As the majority of animals, from the simplest up to and including Amphibians, are either themselves aquatic or have their juvenile stages adapted for aquatic life, the presumption is strong that the dry land was originally peopled slowly and gradually by migrants from the water. Very gradually, of course, must the transition have been effected, now by a wandering worm and again by a curious Crustacean, here by a fish-like form clambering in the lagoon and there by an ancestral Amphibian which learned to survive the drying up of the pool where it was hatched.

Besides pelagic, littoral, abyssal, freshwater, and terrestrial groups, others might be distinguished; thus there are aerial animals, such as birds and insects, and aerial plants, like the epiphytic Orchids and Aroids, or like the Bacteria which drift about in the air; there is the not very abundant population found in brackish water; there is the "cryptozoic" fauna of caves and grottoes, some members of which appear to be ancient relicts, and there are the but little known Fungi found in similar places. Over forty species of animals are known from the Mammoth Cave of

Kentucky, and the total number of recorded cave-dwellers is about three hundred. Finally, in considering the different homes of life, account must be taken of the immense number of plants and animals which live as parasites in or on other organisms.

Relations between Life Areas.—According to Moseley, "The fauna of the coast has not only given origin to the terrestrial and freshwater faunas, it has throughout all time, since life originated, given additions to the pelagic fauna in return for having received from it its starting point. It has also received some of these pelagic forms back again to assume a fresh littoral existence. The terrestrial fauna has returned some forms to the shores, such as certain shore-birds, seals, and the polar bear; and some of these, such as the whales and a small oceanic insect, *Halobates*,

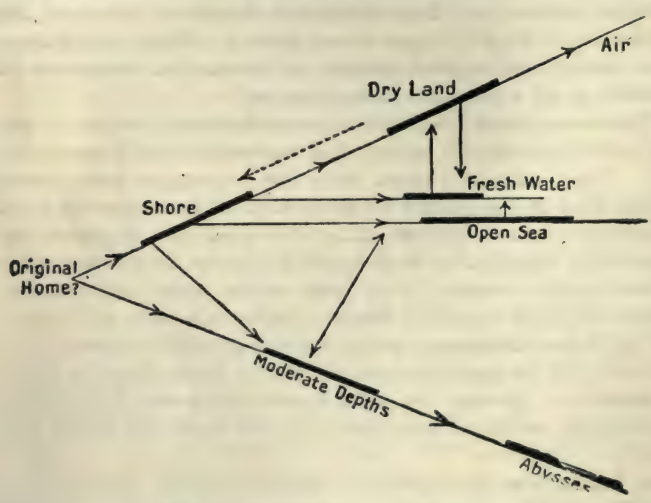

FIG. 46.—*Possible Evolution of Faunas.*

have returned thence to pelagic life." "The deep sea fauna has probably been formed almost entirely from the littoral, not in the most remote antiquity, but only after food, derived from the *débris* of the littoral and terrestrial faunas and floras, became abundant in deep water."

According to Agassiz, Simroth, and others, if we may venture to compress their views into a sentence, a littoral fauna was the original one, whence have been derived, on the one hand, the pelagic and abyssal faunas; on the other hand, those of the fresh waters and dry land.

According to Professor W. K. Brooks, a pelagic fauna was primitive, for there the conditions of life are easiest. From the pelagic fauna migrants passed inwards to the shore and downwards to the deep sea, while a possibility of a return-movement from both these areas is also allowed.

Sir John Murray has especially emphasised the importance of "the mud-line," the boundary between the abyssal and littoral (or neritic) regions, at an average depth of about 100 fathoms. It is the line where the minute organic and inorganic particles derived from the land and surface waters find a resting place upon the bottom, it appears to be one of the great feeding-grounds in the ocean, and seems to be very densely peopled. The same authority holds "that in early geological times there was a nearly uniform high temperature over the whole surface of the globe, and a nearly uniformly distributed fauna and flora; and that with the gradual cooling at the poles, species with pelagic larvæ were killed out or forced to migrate towards the tropics, while the great majority of the species which were able to survive in the polar areas were those inhabiting the mud-line."

If we adopt the suggestion that the most probable ancestral home of animals was some region not far from the shore, we may picture the possible relations in a diagram (Fig. 46) which may appear complex, though the probability is that it is not complex enough to be true.

In this brief essay we have of course assumed that conception which is fast becoming organic in all thinking—the general conception of evolution, that the present is the child of the past. If this be true, the various faunas and floras amid which the naturalist wanders have had their history, and it is the task—merely begun—of the students of distribution to spell this out.

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CHAPTER IX.—THE PEOPLES OF THE EARTH AND THE DISTRIBUTION OF MANKIND

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Specific Unity of Mankind.—That mankind forms a distinct zoological genus in the strict sense of the term, that is to say, a separate group amongst the higher mammalia sprung from a single stock, though not necessarily from a single pair, may now be taken as a generally accepted conclusion of modern science. There certainly survive here and there a few distinguished polygenists, who still believe that the main divisions have each had a separate origin from so many specifically different ancestors in different parts of the world, although no two of these pluralists are in accord as to the number of such independent zoological species. But this view is rejected by the great majority of living anthropologists, who, after a long period of "storm and stress" in the early part of the nineteenth century, have returned to the sober teachings of Linnæus, in whose Order of *Anthropomorpha* man appears as a single genus with a single species and four varieties, corresponding to the four main continental divisions of the Earth. The *specific*, and not merely the *generic*, unity of mankind is frankly accepted by Sir W. Flower, the leading English anthropologist, in whose Sub-Order of Anthropoidea, the *Hominidæ* constitute the fifth and highest family, coming nearest to, but still independent of, the *Simiidæ*, that is, the four groups of so-called "man-apes"—Gibbon, Orang-Utan, Gorilla, and Chimpanzee.

The Pliocene Precursor.—The apparently impassable gap which, despite many obvious points of resemblance, still separated the human from the simian group, was largely bridged over by the discovery made in 1892, by Dr. Eugene Dubois, of some human remains embedded in the late Pliocene deposits of the Solo river, in Java. These highly fossilised bones of *Pithecanthropus erectis*, as he has been named by the finder, are regarded by the best authorities as undoubtedly human, and the importance of the discovery may be inferred from the fact that the skull holds a position about midway between those of the Chimpanzee and of the Neanderthal, that is, the lowest human cranium previously described. In other words the Javanese "missing link" is as much below the Neanderthal as this is below the normal European. It presents the characters which were anticipated in Pliocene, as compared with Pleistocene man, should his remains ever be discovered. Moreover, it gives a vastly more remote starting-point for the natural history of mankind, and that in the

very region which many eminent palæontologists have pointed to as the probable cradle of the human family.

Tertiary Distribution of Land and Water.—At the time of the Dispersion, the Indo-African Continent, the existence of which was established by the geologists of the Indian Geological Survey, still formed almost continuous land across the present Indian Ocean, between the Dekkan, Madagascar, and South Africa. The shallow inland waters, nowhere exceeding fifty fathoms in depth, had not yet converted to insular masses the Sunda group (Borneo, Sumatra, Java), now separated by narrow channels from the Asiatic mainland. The Australian continent was connected with New Guinea, and extended westwards much farther than at present. New Zealand also occupied a far wider area, while the Funafuti borings leave little doubt that Polynesia itself is an area of comparatively recent subsidence. In the northern hemisphere Africa was connected with Europe both across the Strait of Gibraltar, and also at one or two other points; Britain still formed part of the mainland, and almost continuous land appears to have extended from North-west Europe through Iceland to Greenland and North America.

The First Migrations.—It is to be borne in mind that the first migrations took place unconsciously, much in the same way as did those of all the other land faunas. The cranial capacity of the Javanese precursor was not much more than about 950 cubic centimètres, as compared with that of the highest apes (Orang 500), and of the highest human beings (Europeans, 1,500 or 1,600). Hence at that time the disparity between man and the lower animals was not nearly so marked as at present. He no doubt could walk erect, and possessed a well-developed hand with which to fashion the rude implements found by Noetling in the neighbouring Pliocene beds of Indo-China. But in other respects the difference could not have been great, and, like the other animals, he must have moved about rather by instinct and impulse, in obedience to the surrounding physical conditions, than of any set purpose. The struggle for existence was also carried on in the same blind way, although in virtue of his greater intelligence he had no doubt already acquired a sufficient supremacy over his competitors to become the one universal species. Not only is man the one member of the animal kingdom whose present range coincides with that of the habitable globe, but this universal domain had already been occupied by him in early Pleistocene times. A considerable mass of trustworthy evidence has in recent years been brought together from every quarter of the world to show that it had been peopled during, if not prior to, the recurrent invasions of ice in the northern and southern hemispheres. That is to say, Pleistocene man had spread over the entire habitable globe while he was physically still but little removed from his Pliocene ancestor, and prior to the development of any culture, and even of any arts or industries, beyond the manufacture of the rudest stone implements. Hence the astonishing resemblance that is presented by

these objects, as well as by the earliest skeletal remains of man himself in whatever part of the Earth they are found—skulls from western and Central Europe, from Egypt, California (if genuine), Brazil and other parts of South America; flints from Britain, France, North and South Africa, Somaliland, India, the United States, Patagonia, Fuegia.

By the land connections indicated above, Pleistocene man was able, without any knowledge of navigation, to pass from his Indo-Malaysian home northwards to Asia and thence by the Bering Strait route into America; and westwards into Africa; thence northwards by two routes (Strait of Gibraltar, Tunis-Sicily) into Europe, and from north-western Europe to Greenland and America during inter-glacial or post-glacial times.

Formation of Varieties.—From this view of the first dispersion it follows that these migrations everywhere preceded the later physical and mental development of mankind, so that the evolution of the existing human varieties and of their several cultures is presented in quite a new light. We need no longer suppose, always a somewhat violent assumption, that some fully specialised group, say, originally black, migrating from continent to continent, became white in one region, yellow in another, brown in a third, and so on. Had such a group passed from its proper zone to another, it would probably have died out long before it had time to become acclimatised. In any case it is now easy to see that the evolution could not have taken place on those lines, but was brought about in the several regions independently, as in the case of other animal varieties. The Pleistocene groups, all alike at first, everywhere presented the same generalised prototype, from which the now living varieties were severally and independently developed. The main divisions of mankind must therefore be regarded, as Linnæus regarded them, as so many zoological varieties, all springing from common or closely allied generalised ancestors, and each gradually specialised by slow adaptation to its special environment. Like all other divisions of the terrestrial fauna, these divisions are thus the outcome of their respective surroundings. They are what climate, soil, diet, heredity and time have made them, and that is the reason why, in the case of all later migrations, the first question that arises is one of acclimatisation. If the new zone is favourable, that is, differs little from the old, the variety persists; if not, it either merges and becomes absorbed in the indigenous element, or else simply dies out. A continuous illustration of this fundamental truth is afforded by the social relations in North America, tropical and extra-tropical Africa, India, Australia, New Zealand, and every other land where European people have failed or succeeded in establishing themselves.

Culture Zones.—With what may be called the first settlement of the Earth by Man in Pleistocene times begins the evolution of the human varieties and of human culture everywhere simultaneously, but with varying results in accordance with the varying nature of the environment. In the most favoured regions, mainly the north temperate zone (the south

temperate being too contracted to constitute areas of specialisation) man has attained his highest development both physically and mentally.

In the eastern hemisphere the space included between the parallels of 25° and 50° N. will about comprise what may be spoken of as the "Culture Zone" in a pre-eminent sense. Within this privileged area, which, following the normal isothermal curves of continental and marine climates, is contracted in the east to 40° N. or less, and reaches in the extreme west to 55° N., have originated and flourished all the great centres of civilisation in ancient and modern times — the Egyptian, Babylonian, Assyrian, Persian, Indian, Chinese, Ægean (Mykenæan), Hellenic, Phœnician, Minæan, Sabæan, Etruscan, Roman, and later European. Within the same area have sprung up all the great religions of the world — the Jewish, Buddhist, Christian, and Mohammedan ; and here also have been developed all the higher orders of speech, that is to say, the three inflecting Hamitic, Semitic, and Aryan linguistic families. Such coincidences are not merely accidental, but have their roots in the soil itself, and are an eloquent illustration of the great evolutionary formula that all living things are the outcome of their environment.

Elsewhere, primitive man has lagged behind, being still for the most part a mere savage in nearly all the tropical, and also, for the reason stated, in the south temperate lands—Central and South Africa, East Malaysia, New Guinea, Australia, Melanesia, Fuegia. The picture is completed by the various transitional phases of barbarism between savagery and civilisation, which are characteristic of the inhabitants of the sub-tropical Asiatic peninsula, the bleak elevated plateaux and sub-arctic steppes of both hemispheres : Indo-China, the Dekkan, Central Arabia, Tibet, Mongolia, Siberia, the great tablelands, prairies, and tundras of the New World.

The diverse anthropogeographical relations here sketched in broad outline have no doubt been somewhat modified, and in places completely obliterated, since the expansion of the higher European peoples during the last four hundred years. But a properly prepared sixteenth century culture-map of the world on a Mercator projection would show a nearly parallel series of shaded bands, indicating the various degrees of progress made by mankind since the Pleistocene period between the equatorial, the arctic, and antarctic regions. Owing to the contraction and great elevation of the land about the equator in the western hemisphere, the chief isocultural deflections occur in the New World, not in the temperate zone, but well within the tropics (Peru, Colombia, and Yucatan). Mexico alone reached northwards a little beyond the tropic of Cancer.

The Progressive Stages of Culture.—The progressive stages of human culture, viewed as a whole, are determined, partly by the activities indispensable to mere existence—hunting, fishing, pasture, and tillage—but far more by the industries associated either with those activities themselves, or with more advanced social conditions. By a systematic study of the remains of the more primitive and later arts, discovered in ever in-

creasing abundance in all parts of the world, archæologists have been able to distinguish certain marked types of stone, and later of metal implements, which everywhere present a surprising general uniformity, and thus serve as a sure guide in following the successive steps by which mankind has advanced from the lowest to the highest plane of civilisation.

The Old and New Stone Ages.—Thus have been determined a *Palæolithic* and a *Neolithic*, that is, an "Old Stone" and a "New Stone" Age, with reference to the material (mostly flint) which in the first, and immeasurably the longer, period, was merely chipped, flaked, or otherwise rudely fashioned, but in the second more carefully worked and polished. Now, it is an ascertained fact that some of the highly specialised varieties of Man known to history—Proto-Hamites, Proto-Semites, Iberians, Ligurians, Pelasgians, and some peoples of Aryan speech—had already made their appearance in Neolithic times both in Central and West Europe, and in all the Mediterranean lands eastward to Mesopotamia. Consequently, the Old Stone Age must have lasted long enough to allow of such stupendous differentiations as those involved in the upward development from the Pleistocene precursor to Linnæus' *Homo Europæus*. It is not, therefore, perhaps surprising that even such a cautious observer as Sir John Evans should have declared that "the remoteness of the date at which the Palæolithic period had its beginning almost transcends our power of imagination."

During these countless ages, estimated by some authorities at several hundred thousand years, the various Pleistocene groups could nowhere have remained stationary, and in the more favoured localities the progress was so great that it is not everywhere possible to draw a hard and fast line between the Old and the New Stone periods. Speaking generally, however, the latter was distinguished from the former by a more complete control over fire, by burial and funeral rites associated with more enlarged religious notions, by the cultivation of cereals and other alimentary plants, by the domestication of several animals, and by considerable progress in most of the useful arts and industries, especially pottery, weaving, architecture. Some of the monuments raised by Neolithic man over the dead—dolmens, menhirs, barrows—were so solidly constructed that they are still found girdling the globe from Britain and Brittany through Iberia, North Africa, Syria, Palestine, India, Korea, Japan, Easter and many other Pacific islands to the New World, where they culminated in the astounding monoliths of Tiahuanaco on the southern shore of Lake Titicaca. They served as models for later generations, as in Etruria, Mykenæ, Phœnicia, Egypt, where the pyramids themselves are nothing but petrified mounds. Thus are connected remote past and present times by the imperishable works of early man, just as the two Stone Ages were connected by the kitchen middens and shell mounds which were common to both periods, and are still found fringing the "beachèd margent of the sea" in so many lands—Denmark, Japan, Australia, North and South America.

Similarly, the present aquatic habitations of savage man in such widely

separated regions as Cambodia, New Guinea, Borneo, Venezuela, have their prototypes in the lacustrine pile-dwellings, *terramare*, *palafitti*, crannogs, and other Neolithic stations, whose sites have been explored in Switzerland, northern Italy, Ireland and Scotland. North Britain appears to have been first occupied by these crannog-dwellers, or possibly by some earlier Neolithic hordes, in places where subsequent geological changes afford some trustworthy data wherewith to gauge the long duration of the second Stone Age. Thus, after the break of continuity between Britain and Europe in glacial times, Sir W. Turner suggests another upheaval, a "Neolithic land-bridge," by which the men of the New Stone Age may have reached Scotland, where they were undoubtedly present during the formation of the Carse clays. These cliffs, which show distinct traces of sea-beaches now in places 45, 50, and 100 feet above the present sea-level, formed the bed of a marine inlet, which in post-glacial times still nearly if not completely separated North Britain from the region south of the Forth. The rise of the 100 foot terrace was followed by an immense development of forest growths, which have since disappeared, and all these oscillations and surface changes fall within the relatively short New Stone period.

The Metal Ages.—Then followed, still in remote times, the introduction of the metals, which, generally replacing stone, constituted the three "Copper," "Bronze," and "Iron" Ages, in the order named, but without any further absolute displacements. These metals, once made known, have necessarily persisted for diverse purposes throughout the next ensuing "Prehistoric" and "Historic" Ages down to the present time. Here, indeed, there can be no real dividing lines, and, as shown by the multifarious contents of prehistoric graves, overlappings were of constant occurrence, while the transitions from period to period must everywhere have been imperceptible. In fact, a clearly marked Copper Age has been doubted except in the New World, where, before the discovery, bronze was but little known, and iron (other than meteoric) not at all.

The Prehistoric and Historic Ages.—The Prehistoric Age, which admits of no strict definition, covers that vague period of time, dim memories of which, such as popular myths and legends, demi-gods, eponymous heroes, and the like, survived into the strictly Historic Age. It corresponds to the "Age of the Five Emperors," in the early Chinese records, which was marked by the institution of marriage and the invention of writing, and was preceded by the "Age of the Three Rulers," our Stone Ages, when people dwelt in caves, drank the blood of animals, ate wild fruits or uncooked food, wore the skins of animals, obtained fire by friction, and threw their dead to the beasts of prey. Such universal reminiscences reveal the common background of shere savagery which stands behind the later developments among all the more or less cultured peoples.

Of the Historic Age, which must persist to the end of time, the essential characteristic is the general use of letters, invented in the West as well as in

China in the Prehistoric Age, if not even earlier.[1] In virtue of this invention, gradually perfected through the successive phases of mere pictographs, conventional ideographs, phonetic symbols, syllabaries, and alphabets, all human knowledge worthy of preservation is perpetuated, and thus becomes accumulative.

Civilised Man.—Henceforth the mind grows, so to say, at the expense of the body; man becomes less and less a mere "creature of circumstances," that is, more independent of his environment, which he now largely controls; and as he began by acquiring the ascendancy over all the other members of the animal kingdom, and constituting himself the one universal species, so he ends by bending Nature herself to his will and requirements. By the development of navigation and diverse methods of land locomotion, he has been able to overcome the obstacles of seas and mountain barriers, and thus to move more freely over the face of the Earth. But these processes have been in progress for many millenniums, certainly since late Neolithic times, with the result that the originally well marked varietal groups have become almost everywhere somewhat intermingled, and their distinctive physical characters diversely modified. Thus it is that the primitive racial types have become "ideal quantities," and the original races themselves palæontological studies, while "the more limited groups, now called races, are nothing but peoples, or societies of peoples, brethren by civilisation more than by blood" (Tosti).

Primary Divisions of Mankind.—Under these circumstances it is not surprising that opinions have greatly differed regarding the number and nomenclature even of the primary divisions of mankind, although here again the tendency has lately been to revert to the views of the Swedish systematist. There is a somewhat general consensus amongst ethnologists that the endless sub-varieties may be reduced to about four primary groups —the *Ethiopic* or *Negro*, the *Mongolic* or *Yellow*, the *American* or *Red* and the *Caucasic* or *White*, the term "Caucasic" being of course taken in Blumenbach's purely conventional sense, without any special reference to the inhabitants of the Caucasus. This scheme has the advantage of being based partly on colour, one of the most conspicuous external characters, and partly, as it ought to be, on actual geographical distribution, with no doubt certain discrepancies in both cases. Thus, before the displacements that have taken place in modern times, the *Ethiopic* was mainly confined to the inter-tropical lands west and east of the Indian Ocean (Africa south of the Sahara, and most of Australasia), which jointly constitute the essentially Negro or Black Zone. The *Mongolic* occupies by far the greater part of Asia with some conterminous European districts, and is almost everywhere characterised by various shades of yellow, or yellowish brown, so that in popular language, "Yellow Mongol" and "Asiatic" are practically equiva-

[1] M. Cartailhac describes certain markings on pebbles from the Mas d'Azil cave, which he regards as possibly a rudimentary script dating from the Stone Ages (*L'Anthropologie*, 1896, p. 385 *sq.*).

lent expressions. Thanks to its insular conformation, the coincidence of the New World with the *American* division is complete, and here again reddish or coppery tints prevail from Alaska to Fuegia. Lastly, the *Caucasic* comprises nearly the whole of Europe and Africa south to the tropic of Cancer, with the eastern seaboard to the equator and south-western Asia. This division thus occupies a very distinct zoological zone, disposed round about the Mediterranean waters where the dominant colours are white and whitish or olive brown, with some aberrant deep brown, or even black shades in those districts where this division encroaches on the Black Zone. These dark Caucasic groups (Gallas, Somalis, Abyssinians), are, so to say, balanced by those Mongolic peoples (Finns, Lapps, Turks, Bulgars, Magyars), who have invaded the Caucasic zone, and thus become assimilated in colour and other respects to the white type. All such aberrations are to be regarded as results of the secular interminglings that have everywhere taken place about the ethnical "divides" of the primary groups.

Each of these groups comprises a number of sub-varieties which are sufficiently specialised in type, speech and other respects to constitute tolerably well-defined secondary divisions. A summary conspectus of these groups and sub-groups, disposed according to their more probable genetic affinities, is all that it is possible to give in this place.

THE CHIEF DIVISIONS AND SUB-DIVISIONS OF MANKIND.

ETHIOPIC (BLACK) DIVISION.

I.—WESTERN (AFRICAN) SECTION.

Original Habitat.—Africa south of the Sahara ; Madagascar.

Later Expansion.—North Africa (sparsely) ; Southern United States ; Nicaragua ; West Indies ; Atlantic States of Brazil ; the Guianas.

Population.—Africa, 150,000,000 (?) ; Madagascar, 3,000,000 ; Tropical and Sub-tropical America, 20,000,000. Total, 173,000,000.

Physical Characters.—*Head :* Long (from glabella to occiput) ; prognathous jaws ; broad flat nose ; thick everted lips ; rather prominent cheek bones ; arched brow ; large, round, prominent black eyes, with yellowish cornea ; flat foot ; larkspur heel.

Colour : Very deep brown, rarely quite black.

Hair : Short, black, woolly, flat in cross section ; sparse beard.

Height, above the average : 5 feet 8 inches to 6 feet.

Mental Characters.—*Temperament :* Sensuous, unintellectual, fitful ; mind arrested at puberty, hence unprogressive ; no science or letters ; few arts beyond agriculture, weaving, pottery, woodwork, and metallurgy (iron and copper).

Religion : Nature and ancestry worship ; fetishism ; witchcraft ; human sacrifice ; ordeals.

Speech : Agglutinating, mostly with prefixes ; numerous stock languages north of the equator ; two only in the south (Bantu and Hottentot), Malayo-Polynesian in Madagascar.

Chief Sub-Divisions.—*Wolof, Mandingo, Songhay,* West Sudan; *Chi, Ewe, Yoruba,* Upper Guinea; *Hausa, Bornu,* Central Sudan; *Maba, Nuba, Denka, Shilluk, Bari,* East Sudan and White Nile; *Niam-Niam* (*Zandeh*), *Mangbattu, Barambo, Momfu,* Welle river. GROUPS OF BANTU SPEECH: *Waganda, Wanyoro,* Lakes Victoria and Albert; *Waswahili,* East Coast; *Zulu-Kafir,* South-East Coast; *Bechuana, Mashona, Marotse,* South-Central regions; *Ova-Herero, Ova-Mpo, Bateke, Mpongwe,* West Coast.

Aberrant and Doubtful Groups.—*Fula,* Senegambia, Sudan.

Fans, Ogowe and Gabun basins; Bantu speech, negroid type with marked Hamitic traits; Pagans.

Negritoes, numerous isolated groups in the forest regions of the Congo basin; negro features, brachycephalous heads; yellowish colour; dwarfs, 3 feet 6 inches to 4 feet 10 inches.

Bushmen, originally everywhere south of Lake Tanganyika, now mainly in the Kalahari desert, probably akin to the Negritoes.

Hottentots, orginally everywhere south of Zambezi, now confined to Cape Colony and Namaqualand; of Bushman-Bantu descent.

II.—EASTERN (AUSTRALASIAN) SECTION.

Original Habitat.—Malaysia; Andamans; Philippines; New Guinea; most of Polynesia; New Zealand; Australia; Tasmania.

Present Domain.—Malaysia, east of Flores; Malay Peninsula, Andamans, parts of the Philippines, Melanesia, parts of Australia.

Population.—2,000,000, chiefly in New Guinea and Melanesia.

Physical Characters.—Very variable, differing from the African section chiefly in the height, which is about or even below the average; the hair, rather frizzly, wavy, or shaggy (Australia) than woolly; the nose, large, straight, and often aquiline with downward tip; and the lips less thick and never everted.

Mental Characters.—*Temperament:* Boisterous, cruel, treacherous, indolent; generally more savage than the African; head-hunting common in Melanesia; cannibalism formerly prevalent as in Africa; no science, letters, or arts, except agriculture, pottery, weaving, and woodwork; artistic sense somewhat developed, as shown especially in boat-building and wood-carving.

Religion: Nature and spirit worship, totemism; tabu.

Speech: Archaic forms of Malayo-Polynesian in Melanesia; agglutinative with post-fixes in Australia and most of New Guinea.

Sub-Sections.—*Papuans,* the most typical of the Oceanic negroes. Range: Most of East Malaysia, inclusive of Flores; nearly all New Guinea.

Melanesians.—Often grouped with the Papuans; but differences physical, mental, and linguistic, constitute them a separate branch. Range: New Britain and New Ireland; Louisiades; Solomons; New Hebrides, New Caledonia and Loyalty; Tasmania (now extinct).

Australians.—A highly specialised branch, with marked uniformity in type, speech, and usages throughout Australia; disappearing.

Negritoes.—*Andamanese,* the so-called "Mincopies," Andaman Islands; *Samangs, Sakais,* of Malay Peninsula; *Aëtas,* thinly scattered over the Philippines.

MONGOLIC (YELLOW) DIVISION.

Original Habitat.—Probably the Tibetan tableland.

Early Expansion.—Indo-China ; China ; North Asia ; Malaysia.

Present Expansion.—Korea ; Japan ; Formosa ; Turkestan ; Irania ; Asia Minor ; Caucasia ; Russia ; Baltic lands ; Balkan Peninsula ; Hungary ; Madagascar ; Australia ; America.

Population.—China, 380,000,000 ; Japan and Korea, 55,000,000 ; Indo-China, 35,000,000 ; Malaysia, 30,000,000 ; Mongolia and Manchuria, 10,000,000 ; Tibet, 6,000,000 ; Turkestan and Siberia, 7,000,000 ; West Asia, 13,000,000 ; Sundries, 4,000,000. Total, 540,000,000.

Physical Characters.—*Head* : Brachycephalous, moderately prognathous jaws ; very small concave nose ; thin lips ; prominent cheek bones ; small oblique black eyes.

Colour : Yellowish, pale, or white in Manchuria, Korea, Japan, and in Turkey and Russia ; yellowish brown in Malaysia.

Hair : Long, coarse, and black, round in cross section, no beard.

Height : Below the average, 5 feet 2 to 4 or 6 inches.

Mental Characters.—*Temperament :* Sluggish, sullen, industrious in the temperate zone, elsewhere in dolent ; mostly reckless gamblers ; science slightly, arts and letters moderately developed.

Religion : Nominal Buddhists and Mohammedans mostly ; a few pagans and Shamanists ; nearly all spirit worshippers.

Speech : Three great families : 1. URAL-ALTAIC, Lapland to Japan, Turkestan to Hungary ; agglutinating with post-fixes. 2. TIBETO-INDO-CHINESE, Tibet to the Pacific, Great Wall to Indian Ocean ; originally aggluti nating, now in every transition of phonetic decay towards monosyllabism, with numerous homophones distinguished by *tone ;* hence may be called "monosyllabic toned languages." 3. MALAYO-POLYNESIAN, the "Oceanic" linguistic family in a pre-eminent sense, sweeping round from Madagascar across the Indian and Pacific Oceans to Easter Island, and from Hawaii to New Zealand ; agglutinative at various grades of dissolution.

Subdivisions and Aberrant or Doubtful Groups : *Mongolo-Turks.*—Commonly called "Mongolo-Tartars." Chief sub-groups : MONGOLS proper : *Khalka* or *Shara, i.e., Eastern Mongols ; Kalmuks, i.e., Western Mongols ; Buriats,* Siberian Mongols ; *Tungus ; Manchus, Gilyaks.* Range : Mongolia, Manchuria, North Tibet, most of East Siberia. TURKI BRANCH : *Yakuts, Kirghiz, Uzbegs, Turkomans, Nogai, Anatolian Turks, Osmanli.* Range : Lena Basin, Central and West Siberia, Turkestan, Asia Minor, parts of Caucasia, East Russia and Rumelia.

Ugro-Finns, Samoyedes, Lapps ; Finns proper, *Voguls, Ostyaks, Siryanians, Permians, Magyars, Bulgars.* Range : North Siberia and islands east to the Yenisei, Lapland, Finland, Esthonia, Livonia, parts of North and East Russia, Hungary.

Tibeto-Chinese.—Tibetans, Burmese, Shans (*Siamese, Ahoms, Khamti*), *Arakanese, Chins, Nagas, Mishmi, Annamese, Chinese.* Range : Tibet, Himalayan slopes, most of Indo-China and China.

Malayans.—Malays proper, Sundanese, Javanese, Balinese, Sassaks, Bugis, Bisayans, Tagals, Formosans, Hovas. Range : Malaysia, east to Flores, Formosa, Philippines, parts of Madagascar.

Koreo-Japanese.—Koreans, Japanese, Luchu Islanders.

Sub-Arctic.—Chukchi, Koryaks, Yukaghirs, Kamchadales.

AMERICAN ("RED") DIVISION.

Original Habitat.—The whole of the New World.

Present Restricted Domain.—The unsettled parts and some reserves in the Dominion; Alaska, numerous reserves and some north and south-west tracts in the United States; most of Mexico, Central and South America, partly intermingled with the White and Black intruders, partly still independent or in the tribal state.

Population (pure and mixed).—Full blood, 9,900,000; half-breeds, 12,270,000; total, 22,170,000, chiefly in Mexico (8,765,000), Brazil (4,200,000), Colombia (3,150,000), Peru (2,700,000), Bolivia (1,500,000), Guatemala (1,400,000), and Venezuela (1,325,000); in the United States only 250,000, and Canada 100,000.

Physical Characters.—*Head:* Both round and long, intermingled inextricably; slightly projecting massive jaws; large straight or aquiline nose; moderately prominent cheek bones; small straight black eyes; coppery colour, shading off to yellowish or brown.

Hair: Like the Mongol, but longer and coarser; scant beard.

Height: Variable, average or under on the uplands, above the average on the plains (Patagonia, pampas, prairies).

Altogether a type specialised in the New World, probably from generalised Asiatic (pre-Mongol) and European (pre-Caucasic) precursors, the former predominating.

Mental Characters.—*Temperament:* Austere, moody, impassive, wary; science slightly, art and letters moderately developed.

Religion: Polytheistic, with human sacrifices where most developed (Aztecs, Mayas); elsewhere nature worship and shamanism.

Speech: Multifarious, but everywhere of the same *polysynthetic* type, in which the elements of the sentence tend to merge in a single word sometimes of prodigious length. Being unknown in the Old World, this type must have been entirely developed in America from the common germs of articulate speech which accompanied Pleistocene man in all his migrations. There are probably over 200 stock languages of this character, crowded together in astonishing numbers in some coast districts (Oregon, British Columbia, California), and woodlands (Amazonas), but some ranging over vast spaces on the open plains and plateaux.

Chief Subdivisions.—*Eskimo.*—Most specialised of all the aborigines; range for 5,000 miles from Alaska round the Arctic shores to Greenland and Labrador.

Athapascan.—Kuchins, Chippewyans, Apaches, Navajos; Alaska to Hudson Bay with enclaves on west coast and about United States and Mexican frontiers.

Shoshonean.—Snake family: *Bannocks, Comanches, Utes, Moqui.* Range: Oregon to Texas, Idaho to South California and Arizona.

Siouan.—Dakotas, Assiniboines, Omahas, Crows, Iowas, Missouri, Catawba (extinct). Range: Hudson Bay to Arkansas; Virginia, North and South Carolina.

Muskhogean.—Creek family: *Creeks, Choctaws, Seminoles, Chicasas.* Range: Kentucky to Florida.

Algonquian.—Delawares, Ojibwas, Shawnees, Arapahoes, Crees, Blackfeet, and many others. Range: Rocky Mountains to Newfoundland, Labrador to Kentucky.

Iroquoian.—Hurons, Cherokees, Tuscaroras, Mohawks, Senecas, Cayugas, Onondagas, Oneidas. Range: Laurentian Basin, New York, Pennsylvania, Michigan.

Nahuatlan.—Aztecs, Pipils, Niquirans. Range : Mexico discontinuously to Nicaragua.

Huaxtecan.—Huaxtecs, Mayas, Quichés, Pocomans. Range : Vera Cruz, Yucatan, Guatemala.

Muiscan ; Arawakan ; Araucan , Tsonecan.

Cariban.—Caribs, Macusi, Ackawoi, Bakairi. Range : Central Brazil to West Indies (a few still in St. Vincent).

Quechuan. — Quiteños, Peruvians, Aymaras, Chinchasuyos. Range : Quito to Lake Titicaca and Chili.

Guaranian.—Guarani-Tupi family. Range : A great part of Brazil and Paraguay.

CAUCASIC (WHITE) DIVISION.

Original Habitat.—North Africa, south to Sudan.

Early Expansion.—All the Mediterranean lands ; North-East Africa ; Arabia ; Central and West Europe ; Britain ; Irania ; India ; South-East Asia ; Malaysia ; Polynesia ; North-East Asia.

Later and Present Expansion.—The whole of Europe ; Aralo-Caspian Depression ; East Turkestan ; Manchuria ; Korea ; Japan ; North Africa (return) ; Abyssinia ; South Africa ; North and South America ; Australia ; New Zealand.

Population.—Europe, 355,000,000 ; Asia, 280,000,000 ; America, 115,000,000 ; Africa, 15,000,000 ; Australasia, 5,000,000. Total, 770,000,000.

Physical Characters.—Two types : 1. Fair (Huxley's "Xanthochroi"). *Head :* long ; moderately large blue or grey and straight eyes. *Colour :* Florid. *Hair :* Long, wavy, flaxen, light brown and red. *Height :* Above the average (5 feet 6 inches to 6 feet). 2. Dark (Huxley's "Melanchroi"). *Head :* Long in south, round in north ; large black eyes. *Colour :* Pale white. *Hair :* Wavy, curly, brown and black. Jaws of both orthognathous ; nose large, straight or aquiline ; cheek bones small, features regular.

Mental Characters.—*Temperament* of 1 : Solid and somewhat stolid ; of 2 : Fiery, fickle ; of both : Active, enterprising, imaginative. Science, arts, and letters highly developed.

Religion : Monotheistic (Judaism, Christianity, Mohammedanism), but polytheistic (Brahmanism, &c.) in India and elsewhere.

Speech : Mainly inflecting (*i.e.*, root and formative elements completely fused), but agglutinative in Caucasia, the Dekkan, and Polynesia. Two great linguistic families : *Hamito-Ibero-Semitic*, North Africa, South-West Asia, Iberia ; *Aryan* (*Indo-European*), nearly all Europe, Armenia, Irania, Northern India, nearly the whole of America, Australia, New Zealand, parts of North and South Africa.

Chief Subdivisions :—SOUTH MEDITERRANEAN.—*Hamites :* Berbers, Tuaregs, Egyptians, Bejas, Afars, Agaus, Gallas, Somalis, Tibus, Masai, Wa-Huma. Range : Mauritania, Sahara, Nile Basin, North-East African seaboard. *Semites :* Arabs, Abyssinians, Syrians, Chaldæans. Range : North Africa, Abyssinia, Arabia, Syria, Mesopotamia.

NORTH MEDITERRANEAN. — *Pelasgo-Hellenes :* Albanians, Greeks. Range : Adriatic to Cyprus and Asia Minor, Rumelia to Crete. *Ligurians :* Most Italians, Corsicans, Sards, Sicilians. *Kelto-Iberians :* Spaniards, Portuguese, Basques, Bretons, Auvergnats,

Savoyards, some English, many Welsh and Irish. Range: North Italy, South France, Brittany, parts of England and Scotland, most of Wales and Ireland.

NORTH EUROPEAN.—*Scandinavians:* Icelanders, Norwegians, Swedes, Danes, Orkney, Shetland and Faroe Islanders. *Low Germans:* Most Prussians and Westphalians, Frisians, Dutch, Flemings, English, Scots, many Irish. *High Germans:* Bavarians, Wurtembergers, Tyrolese, most Swiss, Austrians. *Letto-Slavs:* Lithuanians, Great, Little and White Russians, Poles, Chechs (Bohemians and Moravians), Slovenes, Slovaks, Croatians, Serbs, Dalmatians, Montenegrins.

IRANIC.—Armenians, Kurds, Persians, Afghans, Baluchi. Range: From Asia Minor to Indus, Hindu-Kush and Pamir slopes.

INDIC.—*Northern Hindus* (of Aryan speech): Kashmiri, Panjábi, Sindhi, Bengali, Hindi, Gujaráti, Mahrati, Oriya, Assami. *Southern Hindus* (of Dravidian speech): Telugus, Tamils, Kanarese, Malayalims, Singhalese, some Galchas.

INDONESIAN.—*Asiatic Mainland:* Gyarungs, Lolos, Mossos, Kuys, Khmers (Cambodians), Charays. *Malaysia:* Battas, Tinguians, Manobas. *Polynesia:* Samoans, Tahitians, Tongans, Maori, Marquesas, Hawaiians.

AINU.—South Kurile Islands, Yezo, South Sakhalin.

CAUCASIAN PROPER.—Georgians, Lazes, Circassians, Abkhasians, Kabards, Chechenzes, Lesghians; both slopes of Caucasus.

Population of the World According to Races.—From this survey it appears that since Neolithic times the two lower groups (Ethiopic, American) have been losing, the two upper (Mongolic, Caucasic) gaining ground everywhere, with results expressed in terms of population as under :—

CAUCASIANS ...	...	...	...	770,000,000
MONGOLS ...	...	...	...	540,000,000
ETHIOPIANS	...	...	...	175,000,000
AMERICANS ...	...	...	...	22,000,000
		Total	...	1,507,000,000

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CHAPTER X.—POLITICAL AND APPLIED GEOGRAPHY

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Political Geography.—The body of knowledge included under the term Geography is capable, like most other departments of science, of certain practical applications to the affairs of humanity. But until the student has thoroughly grasped the facts and principles of physical geography and of anthropogeography, he is not in a position to investigate their practical applications with success. Political geography is the application of the data included in these two great divisions of the subject to the affairs of those groups or communities of men which in their more developed condition we designate States or Nations. Groups of this class are of all grades from the isolated village community and the nomad tribe of savages, up to one of the "Great Powers"; but whatever its grade, it is impossible to conceive of any community without associating it with an area of land or territory of greater or less dimensions. The land and the people are integral parts of the State or political community, the one being as indispensable as the other, and therefore a knowledge of both is absolutely essential to a satisfactory understanding of the life and activity of the State.

It may be said that the whole of geography has a practical bearing in this direction, as it deals with the surface of that Earth, which is the theatre of all human activity. We can here only briefly indicate some of the directions in which this practical application can be worked out.

Position on the Earth's Surface.—The position of a country on the Earth's surface is determined by latitude and longitude. The former, from the standpoint of Political Geography, is of much more importance than the latter. Latitude is one of the main factors in the determination of climate. Land in the extreme north or the extreme south is either uninhabitable, or political, social and industrial development is arrested on account of the cold. Extreme heat, with certain modifications, seems also to exercise an arresting influence. But in considering the political development of tropical regions, we must take into account the type of people inhabiting them. How far the geographical environment has moulded the character of the people, it is the business of Anthropogeography to investigate. At this stage of the world's history, the important point with regard to tropical countries is to what extent they are habitable by the white races, by the dominant peoples who have been

habituated to temperate climates. Hitherto, in India and in tropical Africa, the white races have not been able to people the countries, but only to reside temporarily as traders or as rulers of the native population. In tropical countries, as a rule, the necessaries of life can be obtained without much exertion, and as little or no clothing is required, the incentives to exertion for a people in a primitive state are few. The great advances in civilisation, in political, social, and industrial development, have been made in temperate climates.

Longitude, as indicating the position of a State on a great continent, is of importance, as distance from the sea-board has an effect in modifying climate. It is also of commercial and even political importance with respect to communications and distance from important seaports.

Physical Characteristics.—The surface forms or Physical Characteristics of a country, its division into mountains and valleys, into high plains or plateaux, and low plains, the distribution of land and water, the nature of the soil, must evidently have a marked effect on the political and industrial development of a country. A mountainous country like Switzerland or Abyssinia, or a high plateau country like Tibet, presents very different conditions from the well-watered plain of northern Germany, the black earth region of Russia, or the prairies of North America. The highlands of Scotland have reared a different type of people, have had a different history, and a different development from the lowlands, and from the great plain and the uplands of England. These, again, present marked contrasts with the conditions of life and the history of the Sahara and the desert of central Australia. An island State, like Great Britain, is influenced by a different set of conditions from those which prevail on a continental State with contiguous neighbours. The configuration of a coast-line is another important factor in influencing the development of a country. It may be rich in bays and gulfs and estuaries, and fjords forming excellent harbours and giving easy access to shipping, as in the case of Europe, or it may be marked by an entire absence of such advantages, as in the case of Africa, the greater part of the coast of which cannot be approached by shipping, and which, except in the case of the Congo estuary, has no indentations going deep into the land. But it should be pointed out that modern engineering skill has been able to overcome some of these disadvantages, and to create a new set of geographical conditions.

Mountains may play an important part in modifying the distribution of rainfall over a country, depending on the aspect they present to the prevailing winds. Their direction may be such as to tap the rain-bearing winds and distribute the precipitation in a direction from which little or no agricultural results could be expected. The Himalayas intercept the rains of the southern monsoon before they can reach the Tibetan plateau beyond ; therefore we find on one side rich forest and other vegetation and on the other sterility. The waterless condition of the Sahara is no

doubt partly due to the direction and the situation of the Atlas range, which intercepts what moisture comes from the Atlantic and Mediterranean. So it is in Australia, the main mountain ranges of which are on the eastern border. Altitude in general is a great modifier of climate ; if of sufficient dimensions it may introduce temperate climates into a tropical country, as in some parts of Africa and South America.

The *Hydrography* of a country, that is, the distribution of its water-supply on the surface, is evidently a matter of prime importance. The main forms in which water is found on the Earth's surface, apart from the ocean, are those of lakes and rivers. Under certain conditions the supply of water stored underground may also be of economical value, as in the Sahara and Australia. A widespread network of rivers, as in England and over much of Europe, gives a State a great advantage in the development of the agricultural resources of the soil. On the other hand although a very large area of Australia is waterless, yet by sinking wells a supply of water has been obtained in some districts sufficient to irrigate an extensive area and so turn a desert into valuable grass lands for cattle and sheep. It is often possible when the beds of streams are steep, or when they are broken by waterfalls, to utilise them as sources of power for machinery instead of steam. Thus it comes that in countries like Switzerland and Norway electric lighting is common even in small villages, while Niagara Falls supply power to innumerable factories both on the Canadian and the United States side.

Lakes are also of some importance in these respects, and that importance is increased when their stores of water can be distributed either by rivers or by canals, for purposes of fertilisation, for industrial uses, or for the water supply of large towns. Both rivers and lakes, when of considerable size, and especially when supplemented by canals, may be of great utility as means of communication or transport. They were of still more importance before the extension of railways.

Dimensions.—This element, composed of length, breadth, altitude and area, has various important bearings on the life of a community or State. The extent of a country from north to south may be of prime significance. Canada extends from the latitude of Lisbon to the Arctic regions, the result being that a large area in the north is unavailable. Even the United States has during the course of the year a climate varying from tropical heat to Arctic rigour. These two countries in the east and west direction extend from the Atlantic to the Pacific Oceans, so that while their east coasts, owing to certain physical conditions, have a severe, and, in the case of Canada, an Arctic winter, their west coasts have a comparatively mild climate. The British possessions in South Africa extend from the temperate climate of Cape Colony to the tropical conditions of Lake Tanganyika; this gives a great advantage over a purely tropical country so far as Europeans are concerned. Similar conditions are found in Australia.

Area is of importance in many ways. A State of very small extent is

not necessarily an inferior Power. The actual areas of Athens and Sparta, of Phœnicia and Carthage, and even of Rome were comparatively insignificant, but these were all of them Great Powers in their time. In the middle ages Venice and Genoa were insignificant in size, but they exercised great influence owing to their commercial supremacy. The Hanseatic League may be said to have had no territory at all, but here again the magnitude of its commercial transactions gave it great influence in the affairs of Europe. The United Kingdom is only half the size of France or of Germany. But its geographical position has given it great commercial advantages, and these combined with its mineral resources, have endowed it with wealth sufficient to maintain a powerful fleet by means of which it has been enabled to acquire and maintain additional territory in other parts of the world. Unless a continental State is of considerable extent, although it may become commercially important, as in the case of Norway, Belgium, Holland, it can never develop into a Great Power, as the population could never increase sufficiently to admit of the establishment of a great army. On the other hand an extensive territory, bordering on the territories of other States, or scattered in sections over the globe, is vulnerable at many points, necessitating the maintenance of a large army or navy, or both, and the establishment of extensive frontier defences.

Boundaries.—"Landmarks" have been a very early institution. Natural boundaries, that is, the boundaries that exist between different types of natural features, are rarely hard and fast lines. Thus the boundary between sea and land is a more or less broad strip. So also there is generally a zone of transition between mountain and valley, between forest and grass land, between the nevé and the glacier, between the river and its banks. Human races also are seldom sharply separated in their habitat, there is always a certain amount of intermingling on the border. Among certain primitive peoples there is no hard and fast line delimiting their territories; in central Africa certain of the native States seem to be separated by a neutral zone. So is it also among certain of the coast tribes of British New Guinea. Until quite recent years there was a broad neutral zone separating China and Korea. In mediæval Europe the "Mark," the "Marches," the "Borders," consisted of a more or less broad belt, it might be a mountain range or a clearing in a forest or a strip of waste land which separated two tribes, or communities, or States. Where there is a scanty nomad or primitive population the need for rigid boundaries is not felt. Natural features at first sight seem to form the most suitable boundaries—a river, a mountain range, a lake, a desert, the ocean itself, and in more primitive times when the Earth was not so fully peopled, no doubt this was so. But as a matter of fact, most of the great rivers are now included in single States; as a result of the Franco-German War of 1871 the Rhine ceased to be the boundary between France and Germany, and became throughout its middle course a German river. With the growth of States, the growing supremacy of a few "Great

Powers," the increase of population, the development of commerce and industry, and the growth of naval and military power, natural geographical boundaries have been overridden, especially in Europe and Asia. A State is like a living organism which as it grows in strength must expand. Expanding Prussia was bound to find an outlet to the ocean, and so in 1866 made her boundaries overlap Schleswig-Holstein. A great State like Russia could clearly not be debarred access to ports open all the year round, and therefore her pushing outward to the Pacific was inevitable. A great commercial country must have an accessible sea-board, and if she cannot obtain one by diplomacy, she must endeavour to get one by force.

Ignorance of geographical facts sometimes leads to strange mistakes which may be to the disadvantage of one of the parties to a boundary treaty. Thus when the boundary between the United States and Canada was arranged in 1846, the line was to proceed across the Lake of the Woods to the north-west corner, and then follow the forty-ninth parallel. It was afterwards found that the lake extended far to the north of 49°, so that the United States in this way obtained a section of territory within Canada, and the islands in the lake are divided in the most capricious way. Boundaries are generally made at first on paper with the aid of maps, and when the final delimitation is made on the spot, the imperfections of the maps used sometimes gives rise to serious disputes, as has been the case in delineating the frontiers between Russian and British territory in Asia, and between some of the European Powers in Africa. As a rule in settled countries boundaries are arranged between two contiguous Powers, either by diplomacy, by purchase, or by war. But in regions occupied by uncivilised or semi-civilised peoples, which civilised Powers desire to annex in whole or in part, there may be several parties to a boundary, and these may or may not include the natives themselves. Thus the boundaries of what is known as British East Africa were arranged between Great Britain, Germany and Italy, the native population having no voice in the matter. But to this arrangement France did not formally give her consent, and at one time considered herself at liberty to ignore the boundary line on the west, and to lay claims to a position on the Upper Nile.

FIG. 47.—*Boundary between the United States and Canada at the Lake of the Woods.*

The most uncompromising type of boundary is the ocean; hence the

advantage which the United Kingdom has over continental States. Owing to the nature of the boundaries of the United Kingdom, she is enabled to dispense with a large standing army, but is compelled to maintain a powerful fleet. The United States and Canada have also the advantage of being bounded on two sides by the ocean, each of them having only two land frontiers, differing in this respect from a country like Austria, which is almost entirely surrounded by other States. Next to the ocean, perhaps the simplest boundary is the line of latitude or longitude. West of the Lake of the Woods, the boundary between the United States and Canada is the 49th parallel of north latitude until it reaches the sea. In Africa the boundaries between the "spheres" of European Powers are often straight lines, not necessarily coinciding with lines of latitude or longitude, but drawn from point to point. The disadvantage of straight lines is that unless the country has been carefully surveyed disputes are apt to arise as to the position of particular places. Where a river is taken as a boundary, the line runs through the Thalweg or centre of the river-bed; the disadvantage here is that unless the river has been fully surveyed, disputes may arise as to which is its true upper course, when there is more than one upper stream, or the stream itself may change its course, like the Yellow River in China. In Europe boundaries are more complicated than in other parts of the world, for they have been subject to alterations, mainly by war, for more than a thousand years. Like most boundaries that have not resulted from actual annexation, they were probably originally tribal or racial, and to understand the many changes which have taken place in them, it is necessary to master the racial movements in Europe. Roughly they now coincide with linguistic distinctions, though this rule is far from rigid.

FIG. 48.—*Fortresses on the French frontier.*

Over a large part of Europe the boundaries between the different States are marked by no outstanding physical feature, and can only be detected along the highways by posts or pillars or some other artificial mark, or the location of a custom-house. For military purposes the boundary line becomes a "frontier" which extends for a varying space on each side of the line on the map. Troops and fortresses are not ranged

on the actual line, but at selected points in its neighbourhood. The boundaries between sub-divisions of old countries, like England, Germany, and France, sometimes indicate the limits of old independent States, or of ecclesiastical jurisdictions, or of tribal territories; the modern tendency is to abolish them, and to substitute more convenient administrative divisions. In new countries, like the west of the United States and Canada, the sub-divisions are more often made by mathematical lines.

Internal Development.—All material progress is dependent on the interaction between humanity and its geographical environment, and the rate of progress is almost directly in proportion to the extent of man's activity in dealing with that environment. In Australia, and in tropical Africa, the aborigines have remained at a low level of progress partly because they have been in the main content with what nature provided with little or no active interference on their part. They are, of course, people of a type different from those who have developed so greatly in Europe, Asia, and America, and the question arises how far such types are the product of their environment. Purely pastoral pursuits in regions where only the natural resources are utilised, as in the Sahara, Arabia, and Central Asia, do not conduce to continuous progress in a community. It is only when man begins to improve the natural conditions that he enters upon the upward path of development. The cultivation of the soil, the attempt to domesticate animals, and improve breeds of stock, the working of mineral resources, the pursuit of fishing, will among an energetic people lead to the improvement of the means by which these pursuits are carried on. This would develop the intelligence, and initiate manufactures of various kinds which are bound to go on improving. Increase of population in any country will lead to the occupation of further territory and the improvement of waste lands, as well as the opening up of the country by the destruction of forests. When this destruction is reckless it is apt to affect the climate injuriously. The progress of internal development necessitates the establishment of communications by land and water between different sections of the community. These will no doubt be simple enough at first, mere narrow tracks as in tropical Africa, permitting the passage of only one man at a time. The introduction of beasts of burden greatly improves intercourse and traffic, and this improvement, with increased manufactures and the establishment of market centres, leads to the growth of commercial towns.

Towns.—Probably one of the first causes which induced men to live together in enclosures was mutual protection, either from hostile communities or from wild beasts. Many of the oldest towns had their beginning under the protection of the fortified castle of a powerful chief. In central Africa at the present day the natives almost entirely live within enclosures around the chief's or headman's kraal. But as industry and commerce, and the political life of the people develop, many other causes come into play leading to the establishment of towns and cities. The late

Mr. Green showed how natural it was that London should have started in its marvellous growth from the landing of the Romans on the first little height of land they reached on sailing up the inviting estuary of the Thames, which is the natural highway into the heart of the land for traffic from the continent of Europe. It became the great *entrepôt* and distributing centre where, in time, much of the commercial business of the world came to be transacted. This, with the fact that it became the capital of the kingdom and the empire, will to a large extent account for its wonderful growth. On the other side of the island, Liverpool and Glasgow have also grown into great commercial centres, since the increase in the traffic across the Atlantic, although they both had certain natural disadvantages. Glasgow was situated on a narrow shallow stream suitable only for boats. But it was surrounded by coal and iron mines, and in order that the products of these and of the industries which accompanied them should find a direct transit to the outside world, the shallow stream was deepened into a great highway, navigable by ocean ships. Manchester owes its growth to the fact that it is a suitable centre for the manufacture of the raw cotton imported into Liverpool from America. The handsome city of Vancouver on the coast of British Columbia, opposite the island of that name, owes its existence to its being the terminus of the Canadian Pacific Railway, and the point of departure for steamers across the Pacific. The town of Rossland in the Kootenay District of British Columbia grew up from nothing to a population of 6,000 in four years, owing to its being in the centre of a newly-discovered mining district; but such an origin contains the germ of decay, for if the mines should be abandoned the city would be at once deserted unless other resources had in the meantime been developed. Similarly there exists a reason for the position and the development of every town in whatever part of the world it may be situated.

Land and People.—The actual relations of the community or State and the land is an interesting feature in political geography. No doubt in primitive communities the land belongs to the whole community. In Russia at the present day the land of each *mir*, or commune or parish, belongs to the whole commune. In England the "Crown" or the State is supreme over all land. The relations of the State to the land is an important feature in the political geography of every country.

It would be a nice point of inquiry to what extent the form of government of a community is due to its geographical conditions. No doubt the peculiar geographical position of the United Kingdom which minimises the importance of the military element, has had something to do with the stable development of the political condition of the country, though the question of race is also involved here. The contrast with France is very marked. The modern German Empire has been welded together and extended through war, and therefore the military element is still predominant there, as it is also in France for opposite reasons. The internal growth of a community or State naturally leads to its expansion, to its value being

increased, in the eyes of those who, generation after generation, have developed it, and whose many common interests in their territory constitute them a nation, which, as in the United States, and indeed in most European countries, may be composed of many different races. This naturally leads to measures being taken for its defence—to the establishment of an army, of defences for the frontiers, and of a navy where that is required. Expansion brings a State into contact with its neighbours, with whom its relations may be friendly or hostile. If it is felt that the boundaries of the State are too restricted to give room for expansion, then attempts will be made to obtain additions to the territory of the State by forcible seizure, by treaty, or by purchase. This expansion will also lead to commercial traffic between neighbouring States, and the establishment of means of communication between distant States. Where a State borders on the ocean or possesses navigable rivers or lakes, ships are built, and the art of navigation improved. This traffic between different communities naturally leads to the growth of important trade centres ; thus some of the towns in southern Germany and Austria, such as Innsbruck and Salzburg, grew up as a result of the traffic between Italy and central Europe, across the Brenner and other passes.

International Commerce.—International traffic has various obstacles to contend with ; there may be geographical difficulties, like mountain ranges over which passes have to be found and roads made, or at a later stage they have to be pierced by railway tunnels. Or if a State borders on the sea there may be a lack of convenient harbours, and this defect, unless remedied, might be a serious commercial disadvantage. If the State is energetic enough it may force its way by expansion to an accessible harbour, or it may, by attention to the development of engineering, overcome natural geographical disadvantages by such means as the creation of artificial harbours, or the construction of breakwaters.

As the development of industry and commerce and of commercial relations with distant States increases, it becomes important to overcome the geographical disadvantage of distance by the introduction of steam power. Thus the means of transit become improved in speed and in carrying power, and the cost reduced, so that it becomes possible to develop regions previously untouched. Facilities for communication by means of correspondence are developed, and electricity is pressed into the service of humanity, telegraph lines are constructed, cables laid round the world, or wireless telegraph established, by means of which the most distant communities are brought into the closest relations.

Artificial restrictions on commercial intercourse are frequently established, such as customs duties on certain articles imported, sometimes in order to raise a revenue for the State, sometimes in order to encourage native industries by increasing the price of imported articles. This may lead to the discouragement of industry in certain countries. Thus the sugar-cane industry of the West Indies has been nearly ruined because

continental nations impose a heavy duty upon it to encourage the beetroot sugar industry. Most nations have such restrictions to a greater or less extent. In the United Kingdom they are confined to one or two articles of luxury, and therefore it is said to be a free-trading country. Sometimes States form what is called a commercial union, agreeing to accord each other certain advantages in their commercial intercourse which they do not accord to other States; or it may be to agree not to give to any other State a greater favour in the imposition of duties than they accord to each other. Even before the union of the German States into the German Empire there existed what was called the Zollverein or German Customs Union, by which free trade existed between them. Until recently Hamburg remained outside of this union, and was a free port, and even yet on a small area of the city, on the harbour, merchandise may be landed free of duty. Though independent of each other in many respects, the various States that form the United States have free trade with each other, and so have the self-governing provinces of other federal dominions, such as the Dominion of Canada. States may also form political unions with each other for the purpose of mutual defence under certain contingencies.

Colonisation.—The internal development of a State, and the expansion of its boundaries may reach a stage when further development is impossible by what may be called contiguous expansion. In that case a State may seek to acquire further territory at a distance from its own boundaries. Both the Phœnician and the Greek States sent out what they called colonies. These often consisted mainly of the foundation of new cities, sometimes with a greater or less extent of territory around. Often in the case of the Phœnicians they were only trading posts, more or less independent of the mother country. Carthage was originally a Phœnician colony, and grew to be a great independent State that sent out colonies of her own. Rome's annexations became part of the empire, governed from the centre. In modern times, Portugal and Spain, Holland, France, the United Kingdom, and Germany, have taken possession of territory at a distance from their own lands. At first this was mainly done for trading purposes, though both Portugal and Spain in the sixteenth and seventeenth centuries, in Asia and America, as well as in Africa, annexed large areas which were treated as part of their own dominions. Natives of the mother States went out partly as rulers, partly as traders, many of them staying permanently, and making these lands their homes. Many of the inhabitants of the United Kingdom went in large numbers to lands beyond the seas, especially to North America and to Australia. These new territories were treated by the mother country as part of her own domain, and dealt with in the interests of the Home Government rather than of the population who lived upon them, and who had acquired those territories either by conquest or purchase, or by simply taking possession without consulting the aboriginal population. This conduct led to certain of the

British colonies in North America declaring their independence of the mother country, and establishing new States. But as the other distant colonies developed and became populous and wealthy, the jurisdiction of the mother country over them became more and more slender, and so far as their territory and their internal affairs are concerned, they became independent, and even treated the mother country commercially as a foreign land.

The French colonies have not developed in the same way as the British. One of them, Algeria, is dealt with to a large extent as if it were a part of France, and they are all directly governed from the mother country, although several of them send representatives to the French Parliament. This condition of things is mainly due to the fact that Frenchmen have not migrated and settled in their colonies to anything like the extent that has been done in the case of the British colonies. This may be partly due to the fact that the geographical conditions in most of the French colonies are not favourable for European settlement, for in that part of Canada which was once a French colony there is still a large and growing French population. The United Kingdom has possessions of a somewhat similar type to those of France, but these are tropical like India, the Straits Settlements, Central Africa, and the West Indies, where the native or coloured population has not been displaced by people of European origin, and where Englishmen reside more or less temporarily as administrators or traders. The administration of colonial possessions is sometimes confided to a chartered commercial company, acting under the central government of the colonising country.

New Colonial Forms.—The expansion of European States has recently become so great, and commercial development so rapid, that the most enterprising of them have sought still further to extend their territories and expand their markets by taking possession more or less completely of such portions of the globe as remained unannexed. This haste has given rise to a new and curious political factor, seen especially in the case of Africa, which within recent years has been partitioned among the Powers of Europe. So rapid has been this partition, and so extensive has been the share of each Power, that it has been impossible to take effective occupation of the territories, except at a few accessible points. Therefore it has been agreed among the Powers concerned that certain large areas beyond the stations occupied (the Hinterland) should be regarded as the "sphere of influence" of the Power occupying the stations. The main object of thus reserving spheres of influence is commercial, most of the Powers concerned placing restrictions on foreign commercial enterprise. But these great areas claimed by the Powers of Europe are regarded as integral parts of the dominion or empire of these Powers, so that in reckoning up the area of the British, the French, or the German possessions we include every square mile of land in any part of the world over which they claim to have "influence." The one exception

is Egypt, which, although its affairs are practically directed by the British Government, and its principal officials are British, more so than is the case with an Indian native State, yet it is not nominally included in the British Empire. Another new form of political factor has been created by one State leasing part of its territory to another. This was done in 1894, when the British Government leased to the King of the Belgians a portion of British East Africa on the Upper Nile. Previously the Sultan of Zanzibar had leased part of his territory to the United Kingdom and to Germany, but these Powers ultimately bought the territory outright. Some years ago Germany, Russia, and the United Kingdom leased certain areas of territory in China, where they established naval and military as well as trading stations. More recently the United Kingdom accorded to France the lease of two stations on the British section of the Niger. All these new departures are due to the internal development of modern States and the necessity of finding scope for the energy of the increasing populations beyond the boundaries of their restricted territories.

The Oceans.—As has been seen, the oceans themselves play an important part in political geography. Still further, it may be pointed out that the sea for a distance of three miles from the coast of civilised States is regarded as forming territorial waters of these States, in contradistinction to the "High Seas," on which there is no jurisdiction beyond that of the flag under which each vessel sails. Certain portions of the sea, more or less enclosed, are sometimes regarded as the property of the States bordering upon them, mainly for fishing purposes—thus the Bering Sea is claimed by Russia on the one side and by the United States on the other. A knowledge of the physical geography of the sea, especially of the currents and tides, is of importance to navigation. The knowledge of the ocean bed is of value in connection with the laying of telegraphic cables. It is also important to know the variations of temperature and salinity and other factors at different depths, as on these to a large extent depend, it is believed, the migration of food fishes.

The results of the interaction between advanced communities and their territories can often be shown quantitatively in the form known as Statistics, which, when arranged with intelligence, are useful as a measure of progress.

Commercial Geography.—The applications of Geography to commerce are so numerous and comprehensive that Commercial Geography must be viewed rather as a particular aspect of the whole subject than as a separate department. The necessary foundation is a sound comprehension of the principles of geography, but this is useless for the special purpose until applied by a practical mind to practical affairs. Commercial geography may be divided roughly into three parts, dealing respectively with Commodities, Transport, and Markets.

1. The principal *Commodities* fall into two classes. (*a*) Those which exist in the substance of the lithosphere, or have been formed there by

slow natural processes, so that the supply is not inexhaustible. All mineral commodities are of this class : gold, coal, and iron are typical examples. After being obtained, most minerals require various processes of reduction or purification before they are fit for use, and materials for carrying out this work must be made available before the resources acquire their full value. (*b*) The second class consists of commodities, the supply of which can be increased and the nature modified by rapid natural processes which are capable of being directed by human agency. This includes all cultivated plants and domestic animals. Most of the raw products of the vegetable and animal kingdoms, such as textiles, require complicated processes of manufacture before they can be utilised, and the work is often carried out at great distances from the places of production.

2. *Means of Transport* include routes by land and sea, the selection of which involves knowledge of geographical features and conditions, such as mountains, valleys, rivers, winds, or ice, and of artificial difficulties like hostile tribes or vested interests. They also include the vehicles or vessels used, and their mode of propulsion and guidance, thus involving engineering and navigation. Pioneer gold miners in an Arctic region have to depend on their own backs or on dog-sledges for means of transport ; in other places rivers are available for canoes or boats, deserts may have to be crossed with camels, or jungle traversed with native porters. Roads and railways are later developments which render possible the most highly developed commerce. It is evident that the value of all bulky raw materials must depend on the possibility of cheap transport. Under this head postal and telegraph systems have also to be considered.

3. *Markets* involve a consideration of the laws of supply and demand, of the artificial restrictions or encouragements presented by protective or prohibitory tariffs, or by bounties, and the more natural effects of free competition. Distance between centres of production and consumption, facilities for handling goods in transit, nationality, language, even religion and superstition are important factors.

In the descriptions in Part II. prominence is given to the products and trade on which the prosperity of each country depends, and statistics of the growth of its commerce are added ; but, except in a few instances, little can be said on undeveloped resources, a subject which concerns future rather than present conditions.

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Heraldic Colour Scheme for Flags.

1. Argent = White.
2. Or = Yellow.
3. Azure = Blue.
4. Sable = Black.
5. Gules = Red.
6. Vert = Green.

PART II

CONTINENTS AND COUNTRIES

BOOK I.—EUROPE

CHAPTER XI.—THE CONTINENT OF EUROPE

By George G. Chisholm, M.A., B.Sc.

Position and Extent.—Europe is, next to Australia, the smallest of the continents. The area to be assigned to it depends upon the limits assumed, which vary partly in accordance with physical and partly in accordance with political considerations. In the south-east the limit now usually adopted is that of the valley of the Manych, stretching from near the Caspian Sea to the mouth of the Don, and nearly coinciding with the administrative boundary of the Lieutenancy of the Caucasus, the whole of which is thus assigned to Asia. In the east the most obvious physical boundary is formed by the Ural Mountains and the Ural River. The area of the mainland and the adjacent islands within these limits is about 3,750,000 square miles. The addition of Iceland and Novaya Zemlya (Nova Zembla) brings it up to 3,820,000 square miles, and the further addition of Spitsbergen to nearly 3,850,000 square miles. In the east of Russia, however, the political boundary extends some distance beyond the Urals so as to include all the mineral wealth of that region, and on the other hand, it runs, partly along the edge of a low plateau, some distance to the north-west and west of the Ural River. If this political boundary is followed it adds to the area of Europe about 100,000 square miles.

Eurasia.—On a map of the world or the eastern hemisphere, Europe does not seem to have any right to the name of continent. It is seen to be a mere peninsula of a great land-mass the greater portion of which is formed by Asia. To this land-mass the name of Eurasia has been given, and from some points of view the consideration of the larger unit is convenient if not essential. For most purposes, however, the distinction of the two continents is imperative. It has been established by history, and is justified by the physical conditions that have kept the history of the two continents in a large measure distinct. It originated where Europe and Asia are separated by water, and on land the separation is continued by a vast area of desert or sparsely peopled territory between the most populous regions of both.

Coast-Line.—The coast-line of Europe, exclusive of the islands, has been variously estimated at from 19,500 to nearly 48,000 miles. The fact is that length of coast-line is not a definite idea, and no definite figure for the coast-line ought to be taught in schools. The length varies according to the degree in which the minor indentations are taken into account. It is important, however, that the coast-line of Europe is certainly longer in proportion to area than that of any other continent; but it is much more important that this greater length of coast-line is so largely due, not to small bays, gulfs, and creeks, but to great inland seas. The whole of Europe is thus brought into easy communication with the ocean.

Surface Features.—These viewed broadly, are very simple. In the north-west there is an extensive highland region occupying the greater part of Scandinavia and advancing to the water's edge in the countless fjords of Norway. These highlands reappear, to a large extent in the same form, in the north-west of Scotland, and in a modified form in the west of Great Britain generally, in the angles of Ireland, and in Normandy and Brittany in France. Another extensive and loftier highland region occupies the southern countries, spreading northwards in the area between Italy and the Baltic to about 51½° N.

FIG. 49.—*Europe, showing circles of 600 and 1,200 miles radius from Cracow*

Between these great highland areas there stretches an area of lowlands mainly composed of low plains broken only by seas. This area begins in England to the north of the English Channel and south-west of the North Sea, and on the mainland stretches continuously from the shores of the Bay of Biscay, the English Channel, and the North Sea to the Ural Mountains, spreading out in Russia from the shores of the Black Sea to those of the Arctic Sea.

In the highland region of the south there are certain minor features too important to be passed over even in a general survey. These minor features are of two classes—(*a*) mountain ranges or systems, (*b*) valleys or plains. The former are the *Alps* in the heart of this southern highland region, the *Carpathians* in the east, the *Balkans* in the south-east, the *Appennines* in the peninsula of Italy, and the *Pyrenees*, stretching from the Bay of Biscay to the Mediterranean and forming a natural boundary which has never been

long ignored in history. Of the lowland minor features the most important are (1) the valley of the Danube, stretching on the whole east and west through nearly the whole of the northern half of the mountainous region, and expanding in its lower part into two great plains, one between the Alps and the Carpathians drained also by the Theiss, the Drave, and the Save, and the other outside the Carpathians between these mountains and the Balkans; (2) the valley of the Po, between the Alps and the Appennines; (3) the north-to-south valley of the Saône and Rhone, between the Central Plateau of France and the highlands connecting it with the Vosges on the west, and the Alps and Jura on the east, a valley of all the more consequence historically and commercially because it is separated only by a low water-parting between the Vosges and the Jura (the opening known as the Burgundy Gate) from (4) the equally important north-to-south valley of the middle Rhine from Basel to Cologne; and (5) the valley, or rather relative depression, called the passage of Naurouse, between the foot-hills of the Central Plateau of France and those of the Pyrenees, containing the low water-parting between the Garonne and the Aude.

FIG. 50.—*The Configuration of Europe, showing Highlands and Lowlands.*

The Alps. — Although the Alps are not the most extensive mountain system in Europe, being surpassed in this respect both by the Scandinavian Highlands and the Ural Mountains, they are the loftiest, and they contain the sources of many of the most important streams of the continent. Their surface is shared, unlike the larger systems, by a number of different countries. Their limits are everywhere well marked except where they unite with the Appennines. Here the proper line of division has been much disputed, but now there is a nearly general agreement in placing the boundary at the Collo dell' Altare or di Cadabona, a pass about 1,600 feet in height, to the north-west of Savona on the route to Mondovi. From this point they stretch round in a curve, west, north, then east—westwards to the frontier of France, then northwards on the borders of France and Italy, and finally eastwards through Switzerland and the west of Austria. Their total extent is about 80,000 square miles, or not much less than that of the mainland of Great Britain. Their total length is about 680 miles, their least width, between Mondovi and the Gulf of Genoa, about 30 miles, and their

greatest width, about the meridian of Verona, a little less than 160 miles. (See Fig. 210 for contrast with other mountain systems.) The highest peak is Mont Blanc, 15,775 feet, in a short range on the borders of France and Italy. Monte Rosa, on the borders of Switzerland and Italy, in the Pennine Chain, rises in the Dufourspitze to 15,215 feet, and there are several other peaks above 14,000, and many above 13,000 feet in height.

The lower slopes of the Alps, up to about 5,300 feet in height, are known as the Fore Alps (in German *Voralpen*, in Italian *Prealpi*), those next in height up to about 9,000 feet, as the Middle Alps, and those above that height as the High Alps. This last altitude may be taken as the average snow-line in about the middle latitude of the Alps, 46½° N. The snow-line is, however, higher on the south side (9,200 feet) than on the north side of the Alps. The higher valleys are filled with glaciers, that of the Lower Grindelwald descending to about 3,500 feet (formerly lower).

Geographical Divisions of the Alps.—These mountains are divided with respect solely to their direction and surface features, into three great and well-marked divisions, the *Western Alps* comprising the section with a north-to-south trend between the Great St. Bernard Pass, north-east of Mont Blanc, and the Collo dell' Altare, the *Central Alps*, extending thence to the Brenner Pass with the valleys of the Adige-Eisack and the Wipp leading up to that pass on both sides, and the *Eastern Alps* comprising all the remainder. In the Western Alps the subsidiary ranges and the valleys are generally tortuous, at least on the outer or French side of the system, but in the other two divisions longitudinal mountain ranges and long valleys running between them east and west are a well-marked feature.

Passes of the Western Alps.—On the east or Italian side of this division secondary chains run inwards towards the basin of the Po with some regularity, and among the valleys thus formed, two are of great importance with regard to the communication across the mountains, each of them leading up to two important passes. One of these is the valley of the Dora Riparia leading due west from Turin up to Susa, where the road forks, one branch going north-west across the Mont Cenis Pass (6,835 feet) to the valleys of the Arc and Isère, the other going south-west across the Genevra Pass (6,080 feet) to the valley of the Durance and the south of the Rhone valley. Both of these were much used in the middle ages, but the former has been superseded by a railway tunnel. The second important valley is that of the Dora Baltea, leading up to Aosta, the town still commemorating the name of its founder Augustus, who built it as the key of the two Roman roads laid from this point, one across the Great St. Bernard (Mons Jovis) to the valley of the Rhone, the other across the Little St. Bernard, south of Mont Blanc, to the valley of the Isère.

Passes of the Central Alps.—Several passes long combined to confer importance on one city in northern Italy—Milan, and one route

on the north side, that of the Rhine valley above the lake of Constance. On the south side of the Alps most of these routes followed at first the side of the lake of Como or were gained by a boat-voyage up that lake, but one of them ascended Lago Maggiore and then struck north-eastwards. On the north side all of them after crossing a single pass, or at most two passes, reached the Rhine valley above Chur (Coire, *Curia Rhætorum*), and emerged from that valley almost due south of Ulm, on the Danube, thus contributing to the importance of that town. In Roman times and till late in the middle ages, the Septimer was the most important of these passes, though it is no longer a carriage-road. A more direct route across the Alps from Milan by the St. Gothard Pass was not made practicable till a late period, and not made easy till 1707, when a tunnel was pierced through the side of the gorge of the Reuss. In 1882 this route was supplemented by a remarkable railway tunnel 9¼ miles long (see Fig. 134). Even in Roman times Milan was connected with the Rhone valley by a road following at first the west side of Lago Maggiore, and then across the Simplon Pass (6,600 feet), which is now also being superseded by a railway tunnel of even greater length (about 12¼ miles).

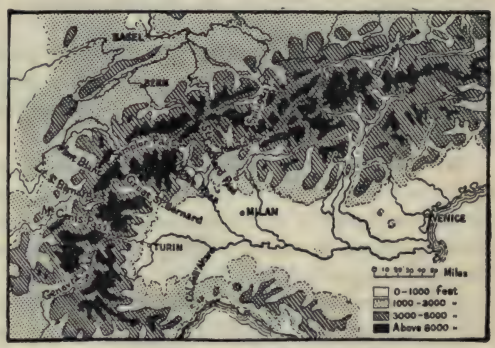

FIG. 51.—*The Alps and their chief Passes.*

The Brenner.—The transverse breach forming the Brenner route, and taken as the line of demarcation between the Central and Eastern Alps, is so well marked and for the most part so convenient that it has formed from the earliest times an important highway both for commerce and for war. The pass itself is low (only 4,470 feet), and if the Inn valley is made use of downwards no other pass has to be crossed in the whole breadth of the mountain system. From the remains found on this route we know that it was made use of in prehistoric times by the Etruscans. It was one of the first of the Alpine passes to receive a Roman road. It was again and again followed by the Holy Roman emperors in their expeditions from Ratisbon, due north of the outlet of the Inn on the Bavarian Plateau, to Italy. It was the first of the Alpine passes to have a carriage-road in the modern style laid across it (1772); and the first to get a railway carriage over it (1867). The chief tunnel on this line is rather more than half a mile long, and there are twenty-six shorter tunnels.

Hydrography.—Besides being a centre of radiation for important

streams, the Alps form one of the principal lake-regions of Europe. The lakes, many of which are celebrated for the beauty of their surroundings, mostly lie on the outer margin of the system (Maggiore, Lugano, Como, Iseo, Garda on the south; Geneva, Zürich, Constance, Ammer, Würm, Chiem, König, Hallstatt, Wolfgang on the north); but others (Walenstadt, Lucerne, Brienz, Thun) lie nearer the heart of the system.

Another important centre of radiation for rivers is the higher ground to the south of St. Petersburg culminating in the Valdai Plateau. From this area issue the Volga and one or two of its chief tributaries, the Dniester, the Western Dvina and the Volkhov. To the north and west of this area, in Russia proper, Finland, and Scandinavia there is another region abounding in lakes of all sizes and shapes. Among these are the largest in Europe—Ladoga, 7,004 square miles, about one-tenth smaller than Wales, Onega, 3,765 square miles, Chudskoye or Peipus, 1,356 square miles, Vener, 2,409 square miles, Vetter, 758 square miles, this last accordingly, though the smallest of the five, being equal in size to the county of Surrey.

A third region abounding in lakes is the northern part of the German plain, especially north and east of the Elbe, and a peculiar feature of the eastern section of this region is the large number of lakes in it (mostly very small) without any visible outlet.

Geology.—The geological structure of the mountainous region of southern Europe is as complicated as its orography. The same is true of the highland region of the British Isles, but in Scandinavia the geological changes belong to such a remote past that the steps in the change are no longer distinguishable. The solid rocks both of this peninsula and the adjoining parts of Russia to the east of the White Sea and the shores of Lakes Ladoga and Onega are mainly composed of materials so metamorphosed that they are all classed as Archæan crystalline rocks. Between the highland areas the rocks are for the most part more recent except in northern Russia. In the English lowlands Jurassic rocks cover a considerable area, but on the mainland of Europe those of Cretaceous age are generally the oldest, except in the region just mentioned. Above the Cretaceous areas of the plains are extensive deposits of Tertiary age (also widespread in southern Europe); and northern Germany, Denmark, and Holland are mainly composed of Quaternary deposits.

In the Quaternary history of Europe an important episode was the advance on more than one occasion of a vast ice-sheet from the Scandinavian highlands over a great part of the plains, and of smaller ice-sheets from the chief mountain ranges of the south, with glaciers of much larger dimensions than those now seen protruding from the margin of the sheet down the valleys. This period is known as the Ice Age, or sometimes the main periods of advance of the ice are distinguished with more precision as the First, Second, and Third Ice Ages. The result of this advance of ice has been to cover vast regions with deposits of morainic matter, in the

form of clay, shingle, or larger fragmentary material, or with deposits of another kind due to the action of water under the ice. The great lake districts of Europe all belong to the regions once buried under these vast ice coverings.

Twofold Division of the Alps based on Geological Structure.—In this division now generally recognised, the line of demarcation between the Eastern and Western Alps is that of the route across the Alps, from Milan to the upper end of the lake of Constance, by the Lago Maggiore (east side), the Val Mesocco, and the Hinter-Rhein. Throughout the Alps the central zone, which contains the highest peaks, is composed mainly of hard crystalline rocks, outside of which sedimentary rocks occur. East of the line mentioned these sedimentary rocks occur both on the outer (northern) and inner side, and on both sides are largely composed of limestones and dolomites, though on the north side these are largely intermingled with sandstones and slates. West of the line there is no inner zone, and in the outer zone limestones and dolomites greatly predominate. The structure is shown in the section of Switzerland (Fig. 130).

FIG. 52.—*The Glaciated Area of Europe.*

Climate.—This is one of the heads under which it is important to remember that Europe is after all only a great peninsula of Eurasia. The climate of Europe can be compared only with that of the corresponding latitudes of the western portion of North America, not the whole width of that continent. This comparison reveals analogies, but also differences greatly to the advantage of Europe. In both cases, the chief rain-bearing, in winter the chief heat-bearing, and in summer the chief cooling winds are from the south-west. Europe, however, in addition to the advantage of receiving its winds from warmer seas, owing to the indirect influence of the Gulf Stream, has no mountains near the coast running at right angles to these winds, and thus cutting off their influence within a short distance; and, on the other hand, its great inland seas, the Baltic in the north, and the Mediterranean in the south, favour the penetration of the equalising influence of the sea further into the interior. Moreover, southern Europe has the benefit of a mountain barrier on the north to ward off cold northerly or north-easterly winds. The result is that all kinds of cultivated products, whether those of the temperate zone, such as wheat and barley, or those of a warmer clime, such as the vine, orange, and olive, can be cultivated in a higher latitude in Europe than anywhere else on the globe.

Barley is regularly grown in Europe (Norway) several degrees within the Arctic Circle. For certain products the advantage of more prolonged sunshine thus enjoyed is of great consequence in improving the quality.

But owing to the direction of the prevailing winds in Europe, there is the same increase in range of temperature from west to east as in western North America, and the same tendency to a diminution of rainfall in the same direction where not counteracted by special circumstances. The easterly increase of range of temperature is noticeable even in the Mediterranean region in spite of the equalising influence of the great inland sea. In the higher latitudes of Europe, however, the increase of range is due more to the increase of winter cold eastwards, in the lower latitudes rather to the increase of summer heat in that direction.

Rainfall.—The easterly decrease of rainfall is regular in Europe only in the region of the plains. Everywhere of course mountains promote a higher rainfall locally, but the effect of position with regard to the prevailing rain-bearing winds is seen in mountainous districts also in the fact that the heaviest rains generally occur in Europe to the west and south of the mountains, and on their western and southern slopes. For the most part the rainfall is tolerably equally distributed throughout the year, but there is a well-marked contrast between the eastern plains and the Mediterranean region, especially its southern portion, as regards the season of most abundant rains. In the eastern plains the most abundant rains are those of the summer. The winter rains are perhaps as frequent as those of summer, but are extremely scanty. Though the winds then blow across the isotherms, and hence at that season are constantly advancing into regions in which the temperature becomes more favourable to condensation, yet from that very fact, they are so rapidly drained as they proceed onwards that they arrive in Russia nearly dry. The summer rains are largely due to local evaporation.

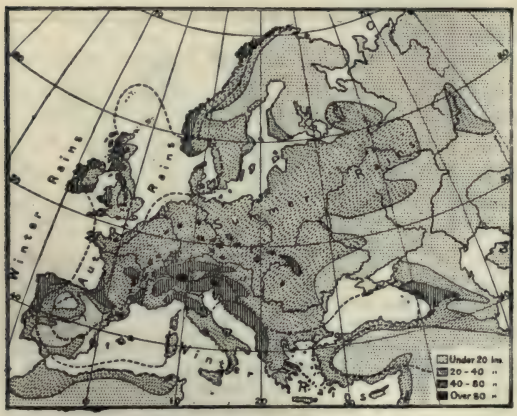

FIG. 53.—*The Distribution of Rainfall in Europe.*

The Mediterranean region, on the other hand, belongs in part to those latitudes which, during the height of summer, are included in the trade-wind zone of the North Atlantic. There is thus a tendency for the winds to be drawn to the ocean from the adjoining parts of the land, a tendency

to the establishment of north-easterly winds. This is further promoted by the intense rarefaction that then goes on over the Sahara. Hence it happens that the further south we go in the Mediterranean region the drier the summers become, and in the extreme south they are almost rainless. It is believed by some that the rainfall of this region has become less within historical times. The evidence of this is not convincing, but it is quite certain that owing to the clearing of forests with the progress of population and cultivation great changes have been brought about. The forests on hill-slopes and mountain sides protected the soil from being washed away, and the presence of the soil kept the rain from running off too rapidly. There was thus a greater extent of ground well supplied with moisture. Rivers were more equal in volume, more useful, less destructive. Now they are an alternation of rushing torrents and dry beds. Through their torrential action they have in some places laid waste the ground with heaps of rocky *débris*, in other places, sometimes assisted by the violence of war, they have converted plains once proverbial for their fertility into malarious swamps, presenting scenes of almost hopeless desolation.

Flora.—The greater part of Europe is occupied by a flora of uniform character, to which the name of the Germanic flora has been given, a flora of forest trees and flowering plants such as are familiar in the British Islands. Only a small area in the north-east, the Russian tundras, has a true Arctic flora composed of mosses and lichens. In the Mediterranean region, and especially in the southern part of it, there is a marked adaptation in the general habit and aspect of the vegetation to a climate with dry summers, and within historical times there has been an increasing diffusion of vegetation of this character answering to the increasing extent of arid soil just explained. In ancient times forests like those of central Europe spread over large areas of the Mediterranean, but now the prevailing forms are low trees with leathery often glossy leaves, retentive of moisture, such as the holly and holm-oak, the laurel and myrtle, the pistachio nut and carob or locust tree, the orange and the olive. Thick fleshy plants, such as the cactus and the agave or American aloe, have also become thoroughly characteristic in the south. The trees do not form great forests, but are scattered in clumps over the landscape. Hence the Italian name of such clumps, *macchie*.[1] The tendency in the Mediterranean is for forests increasingly to give place to *macchie*, and these to a still scantier vegetation. In south-eastern Europe, and in the interior of Hungary, vegetation has another aspect, that of steppes—vast treeless plains, thinly covered with coarse grasses and scattered shrubs.

Fauna.—In the fauna of Europe, as distinguished from that of northern Asia, there is very little distinctive. Europe is regarded from a zoological point of view as forming two sub-regions of the Palæarctic region, one composed of the Mediterranean countries, the other comprising all the rest. Under this head again we are reminded that Europe is only

[1] Plural of *macchia*, from Latin, *macula*, a spot. Changed by the French (in Corsica) into *maquis*.

a peninsula of Asia, for the Palæarctic region includes also all that continent north of the Himalayas. Among the larger or more remarkable mammals still found wild in Europe are the wolf, in large packs in Poland, Russia, and Hungary, and in small troops in the Jura, the Ardennes, the Pyrenees, and the north of Spain; the brown bear in Norway, Sweden, and Russia, and a smaller variety in the Pyrenees; the lynx, still common enough in Norway and Sweden, and a peculiar species all over Spain, very rare in central Europe; the beaver in eastern Europe, the European bison in the forests of Lithuania, the elk in the districts bordering the Baltic on the east and north, the reindeer in Lapland, the chamois in the Pyrenees, Alps, Carpathians, Balkans, and Abruzzi, the Grecian ibex or bezoar goat in Crete, the musimon or European mouflon in Corsica and Sardinia, the alpine marmot at high altitudes between the forests and the glaciers in the Alps, Pyrenees, and Carpathians, the bobak or Russian marmot in the Russian steppes.

People and Language.—The languages of Europe afford some indication of the differences of race in the continent, but are not to be taken as showing the proportions belonging to different races. Here, as elsewhere, historical events have brought about a great mingling of races, and various causes have led to a change of language in many regions. But if language be taken as the guide, it is important to note that probably 95 per cent. of the present population speak languages belonging to the great Aryan group, and fully 90 per cent. to three great stocks of that group, the *Greco-Italic*, the *Teutonic*, and the *Slavonic*. The first of these stocks is that in which there is least correspondence between race and language, one language of this stock, the Latin, having been spread first over the whole of Italy, and also over modern France and part of Belgium, over Spain and Portugal, and parts of Switzerland and Austria, by the prolonged dominion of the Roman power. Another language of the same origin was introduced by immigration into Rumania and Transylvania. At the present day the total number speaking languages of this stock is less than that speaking Teutonic and Slavonic languages. These are now spoken by nearly equal numbers, but in recent years the peoples of Slavonic tongue (in eastern and south-eastern Europe), have been increasing more rapidly within the continent than those of Teutonic speech (German, Scandinavian, Dutch, Flemish, and English). A larger part of the expansion of the peoples of Teutonic than of those of Slavonic speech is taking place outside of Europe. The other Aryan languages spoken in Europe are those of Keltic, Lettic, and Lithuanian stock. Keltic languages are spoken by about three millions of people in Wales, the highlands of Scotland, Ireland, and the west of Brittany, Lettic and Lithuanian by a few millions more in the west of Russia proper, and the north-east of Poland.

The chief non-Aryan languages of Europe are those of the *Finno-Tatar* group, spoken by Lapps and Finns in northern Scandinavia and Finland, by other tribes in northern Russia, by the Magyars in Hungary, and by

the Turks in Turkey. A language the affinities of which are quite unknown is spoken by 560,000 *Basques* in Spain and France at the west end of the Pyrenees. Jews are scattered throughout the continent, but are most numerous in Poland and western Russia, and the adjoining parts of Austria-Hungary and the German Empire. They generally speak a corrupt Hebrew in addition to the language of the country in which they dwell.

History.—The civilisation of Europe began in the south-east and spread from the Mediterranean over the rest of the continent. On the islands and coasts of the Ægean Sea influences proceeding from Asia and Africa (Phœnicia and Egypt), helped on the development of the marvellous civilisation of the Greeks. The Greeks extended their influence by commerce and by the planting of colonies from the Ægean to the shores of the Black Sea on the one hand, and to those of Sicily and southern Italy on the other hand. The Sicilian and Italian colonies rose to a level hardly surpassed by the most flourishing States of the mother country. From mere economic necessities their influence on the native civilisations of Italy must have been immense—greater than can be detected by historical or archæological research. Ultimately, however, native civilisations predominated in Italy, and the most important of these arose in or near the basin of the Tiber. The first was that of the industrial and commercial Etruscans whose chief seats were in southern Etruria, only partly accordingly in the modern Tuscany.

The Influence of Rome.—The Etruscans were vanquished by the growing power of Rome, the city of the Tiber, which ultimately came to spread her dominion round all the shores of the Mediterranean and northwards to the Rhine and the Danube, in places even beyond the Danube. The ancient history of Europe is largely made up of the record of the conquests of this Power; but there were important periods of repose, especially one period of rather more than 80 years (98–180 A.D.), when the Roman empire at the height of its power was governed by four successive emperors (Trajan, Hadrian, Antoninus Pius, and Marcus Aurelius) of great ability and high character. During that time all the countries round the Mediterranean enjoyed the blessings of peace and order to an unexampled degree. Roman institutions were established on such a firm basis as to leave permanent effects on European history, and the empire was provided with most of that great system of military roads that united its remotest frontiers. These roads were made for defence, but when a defending power is worsted roads facilitate attack, and it was by these roads that barbarian hordes made repeated raids into the empire, and in the fifth century again and again advanced to its very heart and ultimately overthrew it in its original seat.

The Influence of the Christian Church.—While the empire was decaying, the Christian Church was growing within it, and as it grew it adapted its organisation almost inevitably to that of the empire. It thus became a great unifying force, and, as some of the barbarians were

already christianised when they made their incursions and the others were speedily gained over to the Church, it served in various ways to extend and perpetuate the influences of Roman civilisation. Thus the Roman roads were not all that remained from the empire as civilising agents. But while the Church was a unifying influence, two causes were at work for centuries tending to promote disruption within the empire. One was its excessive extent from east to west, the other was the difference of language. While the Latin language prevailed over those of the conquered nations of the west, it never prevailed over Greek in the east. The regular division of the empire for administrative purposes into two sections, an eastern and a western, began at the close of the third century, A.D. This tendency to disunion was confirmed by the foundation of Constantinople as the capital of the east in 330 A.D., and by the adoption of Greek as the official language of the eastern government as it was also that of the Eastern Church. Finally, in the ninth century, about four hundred years after the overthrow of the Roman empire in the west, a dispute between the Eastern and Western Churches led to a severance which the difference of language helped to make permanent. Thus while the eastern or Byzantine empire handed on Roman influences, it did so with certain differences. While all western, including all Teutonic, Europe may be said to show direct or indirect traces of the influence of the Roman empire of the west, Russia and some other parts of Slavonic Europe have received such influences both in Church and State with an eastern stamp. The western Slavs of the basins of the Vistula, Oder, and upper Elbe (Poland and Bohemia), as well as that of the Morava (Moravia), were christianised by German missionaries, and so also were the Magyars of Hungary, hence all these adhered to the Roman Church.

The Saracens and the Crusades. — Even before the final separation between the Eastern and Western Churches another faith, Mohammedanism, had made conquests in Europe. In 711 the Saracens, as the Mohammedans of that time were called in Europe, crossed the Strait of Gibraltar and rapidly overran nearly the whole of the Iberian peninsula, establishing a dominion which, though gradually contracted, was not finally overthrown till the end of the fifteenth century. Less durable conquests were made in Sicily, Crete, and elsewhere. The resistance to the Saracens was at first local, but at the end of the eleventh century a great European movement was set on foot for the recovery of the Holy Sepulchre at Jerusalem from their hands. This led to the first Crusade (1096–99). Six others followed down to 1270, and had important effects on European commerce, industry, and civilisation, though they failed in their main purpose.

Subsequent Events.—Subsequently to the Crusades the chief events of European magnitude were the invasion of the European territories of the Eastern Roman Empire in the fourteenth, and the final capture of Constantinople by the Turks in the fifteenth century (1453), the scattering

of Greek scholars over western Europe and the revival of Greek learning that then followed, aided by the invention of printing with movable types that had taken place in the first half of the same century, the discovery of America in 1492, and of the sea-way to India in 1497–98, and the schism of the Western Church due to the movement for reform which was brought to a head in 1517 by Luther's affixing his famous theses to the door of the castle-church at Wittenberg.

The Origin of the Present States.—In the limits of European countries at the present day we see partly the influence of geographical conditions, partly that of historical causes, among which the events briefly sketched in the preceding paragraphs are important. The kingdoms of Spain and Portugal originated in the wars for the recovery of the Iberian Peninsula from the Saracens or Moors. Several different Christian States were formed in the course of this conflict, but most of these were finally united through the marriage of Ferdinand of Aragon and Isabella of Castile, their grandson Charles (Charles V. of Germany) inheriting in 1516 the whole of their dominions, including the kingdom of Granada, which they had conquered from the Moors (1492). Portugal, however, remained, as it still does, a separate kingdom, with a territory separately recovered from the Moors, with the aid of a Burgundian count who became the founder of the first royal dynasty.

The abandonment of the British Isles by the Romans early in the fifth century, led to the invasion of Great Britain in the latter half of the same century by Teutonic tribes, Angles and Saxons, who were the real founders of the kingdoms of England and Scotland, though the latter took its name from a Keltic dynasty.

The separate dominions of France and Germany may be dated from the year 870, when the great empire of Charlemagne (Charles the Great), regarded, in virtue of a consecration by the popes, as a restoration of the Roman empire of the West, was finally divided between two of his descendants, the division corresponding approximately with that of the Romanic and Teutonic tongues. Nearly a century later the imperial dignity was again revived by the popes, being conferred in 962 on Otho the Great, the first of the so-called Holy Roman Emperors, whose dignity survived in name till 1806. The dominion of Otho and some of his successors embraced not only the bulk of Germany but also all the Alpine lands and a great part of Italy, but the obstacles placed by geographical conditions in the way of a real union, must be recognised as among the causes that led to the breaking up of both Germany and Italy into a large number of minor States, so that there was no united Germany or united Italy till the nineteenth century.

The domain of the modern German Empire, founded in 1871, differs from that of the Holy Roman Empire chiefly by the exclusion of the German parts of Austria-Hungary, of Switzerland and the Low Countries, and the inclusion of extensive territories in the east once, or still, Slavonic

in speech. The present dual empire of Austria-Hungary is composed of the territories gradually acquired by the house of Habsburg. With that house the imperial title derived from the Holy Roman Empire (latterly purely nominal) was uninterruptedly associated from 1438 till 1806, when it was relinquished for that of Emperor of Austria.

The Low Countries now form the kingdoms of Belgium and the Netherlands, after a very chequered history. In the sixteenth century entirely attached to the crown of Spain, the northern provinces broke away (1579) in the period of the Reformation, while the southern provinces remained attached now to one crown, now to another. In the Peace of Westphalia (1648), which concluded the Thirty Years' War, the independence of the northern provinces was recognised. The provinces were all again united by the Congress of Vienna in 1815, at the close of the Napoleonic period, but were separated once more in 1830, when the southern provinces revolted and formed the kingdom of Belgium. The Peace of Westphalia recognised also the independence of the provinces that formed the nucleus of the present Switzerland.

The Slavonic territory of the modern German Empire was mainly taken from the former kingdom of Poland. This State became a kingdom in 1320, was for a time extensive and powerful, but misgovernment, due to an impracticable constitution, led to its partition among the three adjoining powers, Prussia, Austria, and Russia, on three occasions (1772, 1793, and 1795), the last partition being complete. Before the last partition the troubles of the French Revolution followed by those of the Napoleonic period (1789–1815) had broken out. The Congress of Vienna, which subsequently settled the affairs of Europe, recognised the results of this final partition, as it did most of the other territorial arrangements existing at the beginning of the period. The only important new arrangement that still subsists from that time is the personal union of Sweden and Norway under one king, the latter kingdom having previously been associated with Denmark.

Since that time the principal changes in the map of Europe have been the transfer of Alsace-Lorraine from France to Germany (1871), and the reorganisation of the Balkan Peninsula at the expense of Turkey: Greece made an independent kingdom in 1830 and extended in 1881; the principality of Rumania created by the union of Moldavia and Wallachia in 1859. By the Treaty of Berlin in 1878, Rumania, Servia, and Montenegro were declared independent of Turkey, Bosnia and Herzegovina placed under Austrian administration, Bulgaria made a principality tributary to Turkey, and Eastern Rumelia an autonomous Turkish province under a Christian governor, an arrangement that lasted only till 1885, when Eastern Rumelia joined Bulgaria. In 1881 Rumania, and in 1882 Servia, was raised to the rank of a kingdom.

The Great Powers of Europe—the United Kingdom, Russia, Germany, France, Austria-Hungary, and Italy—although not free from mutual

jealousies, exercise in some respects a common influence on the peace of the world. The gradual consolidation of Europe into a comparatively small number of powerful countries has been accompanied by the removal of obstacles to intercommnuication. The existing railway system includes many international express routes, which radiate from Paris, Berlin, and Vienna as centres (Fig. 54). Of these the Indian mail route through Paris and Turin to Brindisi; the Orient Express from Paris through Vienna, Budapest and Belgrade to Constantinople; and the Northern Express route from Paris through Berlin to St. Petersburg, are the longest on which trains run without change of carriage.

FIG. 54.—*The Main Railways of Europe.*

STATISTICS.

THE COUNTRIES OF EUROPE IN ORDER OF SIZE.

	Area sq. miles.	Pop.
Russia ..	2,095,500	129,000,000
Austria-Hungary	261,000	45,400,000
German Empire	210,000	56,400,000
France ..	207,200	38,600,000
Spain ..	195,000	18,300,000
Sweden ..	171,000	5,100,000
Norway ..	125,600	2,200,000
United Kingdom	121,700	41,600,000
Italy ..	111,000	32,400,000
Turkey ..	65,000	6,100,000
Rumania ..	50,600	6,000,000
Bulgaria ..	37,300	3,700,000
Portugal ..	34,500	5,400,000

	Area sq. miles.	Pop.
Greece ..	25,300	2,400,000
Servia ..	18,700	2,500,000
Switzerland ..	16,000	3,300,000
Denmark ..	15,300	2,400,000
Netherlands ..	12,700	5,180,000
Belgium ..	11,373	6,700,000
Montenegro ..	3,500	228,000
Luxemberg ..	1,000	236,000
Andorra ..	175	6,000
Liechtenstein	61	10,000
San Marino ..	23	8,000
Monaco ..	8	13,000

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CHAPTER XII.—THE UNITED KINGDOM OF GREAT BRITAIN AND IRELAND

I.—GENERAL

By Hugh Robert Mill, D.Sc.

Name.—In popular usage the United Kingdom of Great Britain and Ireland is most frequently, though incorrectly, called *England*. When James VI., King of the Scots, acceded to the English crown he employed the name *Great Britain* to include the kingdoms of England and Scotland, and the use of this name for the whole country has since been general in official writings, while the more concise form of *Britain* is also in use. It is, however, better in several ways to call the country as a whole the *United Kingdom*, in the same way as the United States of America are spoken of as the United States. It is convenient to use the word *British* for "of the United Kingdom" as it is convenient to use *American* for "of the United States." The official form *Britannic* does not commend itself for general adoption. Euphony suggests the use of *Anglo-* in compound words where the name of the United Kingdom comes first, and of *British* where it comes last; thus, *Anglo-American* but *Russo-British*. It is necessary to give these definitions because there is no general usage in the country, and some local jealousy exists as to the abuse of the words. The *British Islands* is a convenient name for the region occupied by the United Kingdom, and the *British Empire* is a popular expression including all the countries and colonies acknowledging the British Crown.

Position and Extent.—The United Kingdom occupies two large islands, Great Britain and Ireland, and about 5,000 small islands and rocks lying in groups to the north—Orkney and Shetland; to the west—the Hebrides, Isle of Man, the small coast islands of Ireland, and the Scilly group; and to the south—the Isle of Wight, and the Channel Islands, the latter belonging physically to France. The total area is 121,000 square miles, the United Kingdom coming eighth in order of size amongst the countries of Europe. It is convenient to remember that the whole land and sea area of the British Islands is defined by a rectangle of 10° of latitude and longitude. Only Lizard Head, the Scilly, and the Channel Islands lie south of the parallel of 50° N.; and only a part of the Shetland group extends further north than 60° N. The meridian of 10° W. runs through the tips of the western peninsulas of Ireland; while only the south-east of England projects beyond the meridian of Greenwich.

Geology and Configuration.—Although there are now no lofty mountain chains or great rivers in the British Islands, there is much variety of land-form and of scenery, the result of remote geological changes, and of the more recent action of erosion upon the different kinds of rocks which

form the surface. In no other part of Europe, or perhaps of the world, is so great a range of geological strata found in so small an area. In the north and west the most ancient and disturbed rocks known form the land, which is similar in character to the Scandinavian peninsula. Towards the south and east these ancient rocks are succeeded by Carboniferous strata containing the Coal Measures, which give place further south and east to more recent formations usually but little disturbed and resembling those of western France. The northern and western regions have possibly been on the whole land areas since a very early geological period; the rocks of the south and east have been formed by the sediments worn off the northern lands and spread out on the shores of seas, or in great fresh lakes. Volcanic outbursts leading to the accumulation of masses of hard igneous rocks have occurred at various geological periods down to and including the Tertiary in the regions of ancient rocks, which have also been subject to much faulting and folding; but apparently the more recent regions of the east and south were not affected in this way. These facts fully account for the occurrence of the highest land and finest scenery in the north and west, and the lowest and most uniform towards the south and east (Fig. 55). Many of the minor surface features of the islands have been produced by the ice-sheet and glaciers of the Great Ice Age, which scratched, polished, and rounded the exposed rocks, and smothered the lower grounds in vast sheets of boulder clay, partly obliterating the former surface relief. The extreme south of England alone escaped this action. The indented island-

FIG. 55.—*Configuration of the British Islands.*

starred coast of the west of the British Islands points to a depression or a tilting of the whole region westwards after a complex system of valleys had been impressed upon it by erosion. The drowned valleys of the west form fjords or rias penetrating the land, or uniting together to cut off islands. On the east the generally smooth coast, practically without islands, may result from the softer nature of the rocks.

FIG. 56.—*Frequency of Winds from different directions.*

Configuration and History. — The natural physical divisions of the British Islands have given rise to the larger historical divisions by guiding the long struggles of the settled inhabitants against successive invaders. Wherever the character of the land allowed the defenders to offer effective resistance to invasion the old race was enabled to retain its independence, language, and customs. Strong local differences, even distinct feelings of nationality and separate laws are still perpetuated, long after the complete political union of the old countries into the United

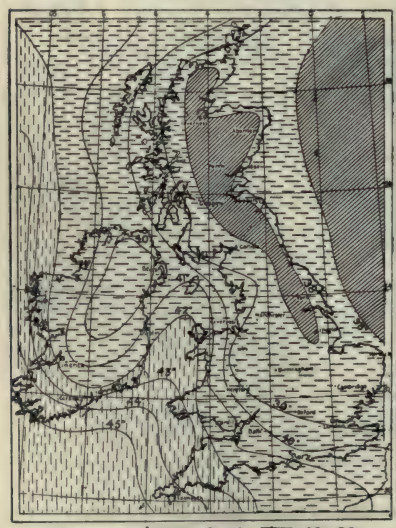

FIG. 57.—*Temperature of the British Islands in January.*

FIG. 58.—*Temperature of the British Islands in July.*

Kingdom, of which England, Wales, Scotland, Ireland, the Isle of Man and the Channel Islands may be looked upon as natural units.

Climate of the British Islands.—The position of the British Islands in latitude secures to them the same amount of heat from the Sun and the

same duration of day and night, summer and winter, as are experienced in central Russia, southern Siberia, Kamchatka, British Columbia, and Labrador; but the direction of the prevailing winds renders available throughout the year much of the heat which the Sun has radiated on more southern regions. As the British Islands are usually covered by the edge of the North Atlantic area of low pressure the prevailing wind is south-westerly. Wind blows from the south-west for a greater number of days in each month than from all other directions together (Fig. 56); a fact which makes the west end of a town the least smoky and therefore the best quarter for residence. The south-westerly winds are commonest and strongest in winter. In April and November they are weakest, and in these months cold easterly winds are comparatively common. The warm water known as the Gulf Stream Drift is driven against the British Islands on the west, maintaining the generally high temperature of the air. The average temperature of the British Islands for the year is about 48° F. decreasing from 53° in the Scilly Islands to 45° in Shetland, so that on the average the climate grows 1° colder for each 100 miles towards the north. The warmest month is usually July (Fig. 58), when an average temperature of 64° prevails round London, and of 54° in Shetland, the air on the whole becoming cooler towards the north, a natural consequence of the Sun being the chief source of the heat supply. But in winter there is an entirely different set of conditions. In January (Fig. 57), the coldest month, the temperature shows no relation to latitude, but the air grows warmer from east to west, indicating that the chief source of heat is then the warm wind blowing from the Atlantic. The east of the British Islands has the average temperature of 39° from Shetland to London, the coldest region, just inland from the east coast, having an average of 38°. In the west and south-west of Ireland the temperature averages from 43° to 45° in January. The winters are thus everywhere mild, but mildest on the coast and especially in the west; and the summers are everywhere cool, but coolest on the coast and in the west. Snow falls on the higher ground every winter; but even the highest mountain, Ben Nevis, is always free from snow in summer.

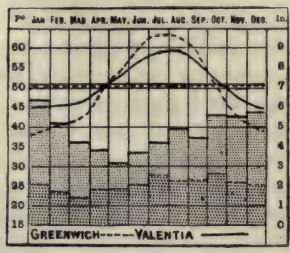

FIG. 59.—*Average monthly temperature and rainfall for Greenwich and Valentia.*

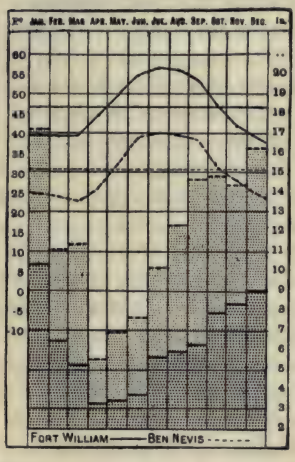

FIG. 60.—*Average monthly temperature and rainfall for Ben Nevis and Fort William.*

Rainfall and Storms.—The rainfall depends conjointly on the prevailing wind and the height of the land. The west coast is naturally the wettest. In Ireland and the outer Hebrides the average annual rainfall is 40 inches, and is very uniformly distributed, as the rain-bearing wind is not stopped by any continuous high land. In Ireland also the numerous lakes and great expanses of damp bogs maintain the moisture of the air. In Great Britain the barrier on the western edge of the Scottish Highlands precipitates a rainfall of over 80 inches, and the rainfall on the heights of the Southern Uplands, the Lake District, Wales and the peninsula of Cornwall and Devon also exceeds 60 inches ; but the whole of the east of the island receives less than 40 inches, while along the east coast less than 30 inches fall ; and in a broad district from the Humber to the Thames the annual rainfall is less than 25 inches. The heavy fall of the west runs off the steep slopes of the land very quickly, while the more moderate supply of the east flows off slowly, and the clay of which much of the plains is composed allows the small rainfall to remain a long time in the soil, thus tending to equalise the conditions in the west and east so far as agriculture is concerned. The weather as a whole is changeable ; fogs are common in all large towns in winter, and the absence of any meteorological stations west of the British Islands often makes it impossible to predict the paths of the frequent and sometimes dangerous cyclonic storms which sweep in from the Atlantic.

Flora.—In the highland regions of great rainfall little soil remains on the steep mountain slopes, and the land presents a bare surface of stones or rock. On the gentler slopes covered with thin soil only moss, fern and heather can grow, and this forms the characteristic vegetation of the high moorlands of Scotland, Wales, and the Irish mountains, which glow with a wealth of purple blossom in autumn. Most of the rest of the surface is covered naturally with rich grass suitable for pasturage. The yellow blossoms of the whin or gorse appear in every month of the year, and in spring the wild flowers of the low grounds are rich and varied.

At the dawn of history Great Britain was a densely wooded island ; but now less than 4 per cent. of the land is under trees, and little of the original forest remains. The clayey plains and peaty moorlands were largely occupied by morasses, most of which have been drained and reclaimed, the most characteristic which remain being the great bogs of Ireland. The native flora of the British Islands is identical with that of continental Europe with the addition of a few American species. The fact that there are fewer species common to the continent and Ireland than to the continent and Great Britain is one of the strongest proofs of the earlier separation of Ireland from Great Britain, than of Great Britain from continental Europe. Pyrenean types found in the south-west of Ireland, but not in Great Britain, may point to a former land connection with south-western Europe. The chief indigenous trees are the oak and beech in the lower grounds, and the Scots pine and birch in the higher and more

northern districts. Many trees and all cultivated plants have been introduced; and those plants common on the continent but rarely seen in Great Britain, such as the sugar-beet, vine, and tobacco could be successfully reared in many parts of the country if proper care were bestowed on them. The mildness and moistness of the climate gives to the vegetation of the British Islands a characteristic freshness at all seasons.

Fauna.—The native animals of Britain in the time of the Romans included the brown bear, wolf, wild boar, and beaver, all long since exterminated, and the wild ox, of which a few herds have been preserved. The red deer is still found in the highlands of Scotland, Exmoor, and the south-west of Ireland, the fallow deer is common in parks, the fox, badger, otter, wild-cat, rabbit and squirrel are found nearly everywhere. The roe-buck, polecat, common brown hare, many varieties of the weasel family, the mole and the whole family of voles or field mice are absent from Ireland, although abundant in Great Britain. The Irish hare resembles that of the highlands, which turns white in winter. There are only about twenty species of mammals native to Ireland, compared with forty known in Great Britain and ninety in Germany. This fact is another proof of the earlier separation of Ireland than of Great Britain from the continent. There are numerous species of indigenous birds, but the great bustard and the capercailzie have died out. The stork, so common on the eastern side of the North Sea, is practically unknown; and the nightingale, although abundant in southern England is rarely heard in Scotland and never in Ireland. Migratory birds visit the islands from the Arctic regions in winter, and from southern countries in summer. The viper is the one poisonous snake, and is not common, while no snakes of any kind are found in Ireland, where the only reptile known is a lizard. All the animals of economic value, and a large number of those protected for sport, have been introduced from other countries. The fish round the coast are those common to all north-western Europe. Flat-fish, as well as cod, haddock and whiting swarm in the shallow North Sea and on banks in the Atlantic; and shoals of herring and pilchard appear off the coasts at certain seasons. The oysters, famous in the days of the Romans, retain, if they have not increased, their reputation. The salmon of the northern and western rivers are also renowned.

History of the British Peoples.—Widely scattered remains of very early date show that the first inhabitants entered the British Islands while they were still part of the continent of Europe. When Pytheas, the Greek colonist from Massilia, discovered and sailed along the east coast of Britain about B.C. 330, he reported that the inhabitants practised agriculture, brewed beer, and mined tin. At a later date successive invasions of Keltic tribes took place across the English Channel, and when Julius Cæsar landed in B.C. 55 he found the coast occupied by the Belgæ; and in the interior there were less civilised Kelts already being pressed towards the western mountains and islands. To this day Keltic names are preserved for rivers—*e.g.*,

Afon (Avon), *Don* and *Uisge* (Ouse, Usk, Esk, Exe)—and for hills, in every part of the British Islands. The Keltic word *Dun*, a fortified height, gave rise to the names of both London and Dunedin (the early form of Edinburgh). The Romans, without mixing much with the people, governed Britain for four centuries, erecting great walls across the northern parts of England and the central plain in Scotland to protect the settled people of the south from the Picts and other wild tribes of the north, and laying out a complete system of roads, many of which still run across the country as straight as ruled lines, in contrast to the poor and winding tracks which came into use later. On the fall of the Roman Empire Teutonic tribes from the continent descended on Britain and particularly on England, some as invaders, others as defenders of the British tribes, but all settled in the land, dividing it into separate kingdoms. The Angles brought their name of English, which ultimately became the general designation of the language, although they did not predominate in number or strength over the other tribes. The Saxons settled great tracts in the southern half of England, the names of the old kingdoms of the East Saxons, Middle Saxons, West Saxons and South Saxons surviving in Essex, Middlesex, Wessex and Sussex. The organisation of the township or early English unit of government is due to these German tribes. Simultaneously with them the pirate ships of the Scandinavian vikings descended on the coasts, both east and west, to plunder or to rule. The Northmen settled mainly on the shores of Scotland and the north-east of England, where most of the place-names even now have Scandinavian endings, such as *by*, *ay*, and *ster*. The Danes for a time ruled the larger part of England, but the greatest Scandinavian influence on the country was brought to bear in 1066, when the descendants of the vikings, who had settled in the north of France and named it Normandy, conquered the Saxon or English lands. They unified the southern part of the country, annexing Wales and Ireland, gave the English language a notable impulse towards its present form, and ingrafted a French culture on the Germanic people. Generally speaking, while mixture between the Keltic and Teutonic races was always taking place, the Keltic clans kept their independence under their chiefs in the highlands and islands of the west, while the Teutonic tribes became fused into a homogeneous nation on the lower and more fertile lands of the east. Great Britain, from the time of the Norman conquest until 1603, was divided between the small northern kingdom of Scotland and the large kingdom of England. The two were always at enmity, and a broad strip of debate-

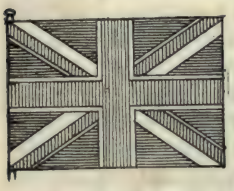

FIG. 61.—*The Union Flag, combining the Crosses of St. George, St. Andrew, and St. Patrick, the patron saints of the three countries.*

FIG. 62. — *The Royal Standard, quartering the arms of England (twice), Scotland, and Ireland.*

able land formed the borders separating the marches of the countries. The lowland Scots and English were, however, one in race and language. The union of the two crowns in 1603 was not followed by the union of the two parliaments till 1707, and in 1800 the suppression of the Irish parliament and the admission of Irish representatives to the British parliament brought about the present constitution of the United Kingdom.

People.—The first uniform census of the United Kingdom was taken in 1801 on the completion of the Union. Since that time the growth and the redistribution of population have been remarkable.

Date.	Population of United Kingdom.	Density per sq. mile.	Percentage of population in England & Wales.	Ireland.	Scotland
1801	16,000,000	131	56	34	10
1901	41,600,000	344	78	11	11

The predominance of England is still more strikingly shown by the trade returns; but the union of the three countries is so complete, and the number of Scotsmen and Irishmen in England is so great that such comparisons are unnecessary and even misleading. The British people at the present day are mainly of Teutonic stock and English speech, the varieties of dialect being mere survivals of former conditions of isolation. In 1891 not quite 5 per cent. of the people were returned as speaking Keltic languages (half of them speaking Welsh, the others Irish and Gaelic) but only one-third of these (half a million people in Wales) were unable to speak English.

The people of the United Kingdom as a whole, although not so educated nor so disciplined as the Germans, and not so polished nor so thrifty as the French, may be credited with perseverance, enterprise and powers of physical endurance beyond the average of mankind, and with a determined independence of character. The valour of the British army, and especially the splendid organisation of the British navy, have preserved the country from invasion and extended the area of the British Empire beyond all others. The enterprise of British manufacturers, merchants and shipowners, has gained a like pre-eminence over all other nations in trade and material prosperity. Respect for law and love of justice are the most striking characteristics of the nation. In the United Kingdom and the colonies Law is recognised as the first power in the realm, and special provisions have been made to prevent the Crown, the government, or the armed services from interfering with its impartial administration.

Government.—The United Kingdom is a constitutional monarchy, the supreme legislative power being vested in a parliament, consisting of the Sovereign, a House of Lords, most of the members of which are hereditary, and a House of Commons, consisting of 670 representatives elected by men who possess certain very general qualifications. Two-thirds of the male population over twenty-one years of age are registered as voters. The House of Commons alone has power over the national expenditure; and it is only on rare occasions that either the House of Lords or the Crown refuses to pass or to assent to any Bill passed by that

House. The executive power nominally vested in the Crown can practically only be exercised by the Cabinet, a committee of about twenty Ministers, who are responsible to Parliament and must resign when they lose the confidence of that body. The House of Commons—"the mother of parliaments"—is the pattern on which the legislative chambers of all democratic countries are based.

Elementary education is compulsory and free. The predominant form of religion is Protestant, except in Ireland, where Roman Catholics are in a large majority. In England the Anglican Episcopal Church is established by law, and in Scotland the Presbyterian Church. The established churches do not include a majority of the population, and membership of them confers no political or public privileges.

The British Empire is an unofficial name which includes the United Kingdom, the Indian Empire, and all the British colonies, protectorates, and spheres of influence. The bond between the various parts is little more than community of sentiment, all the colonies in temperate regions being themselves self-governing countries, their people untrammelled by British legislation, but receiving the advantages of British citizenship and having the right of ultimate appeal in legal matters to the Judicial Committee of the Privy Council in London. The one material privilege within the empire not extended to foreign countries is the Imperial penny postage established in 1898. There is no compulsory military or naval service; and there are no protective duties on trade in the United Kingdom, although they exist—even against the mother-country—in almost all other parts of the British Empire. On account of the scattered nature of the empire and the vital importance of its foreign trade, the avowed defensive policy is to maintain a navy strong enough to secure the command of the sea. Permanent squadrons are stationed in the English Channel, the Mediterranean, the Pacific, and on the coasts of India, China, Africa, North America, South America, and Australia, and a system of fortified coaling stations makes it possible to send a British warship to any point on the surface of the ocean, and to prevent the war-vessels of any other nation from going far from home.

FIG. 63.—*The British Empire on a Colonial postage stamp.*

Economic History.—The Romans dealt with Britain as a colony by encouraging the growth and export of grain, developing the fisheries, and constructing trunk-lines of communications. They also utilised the mineral resources—the tin of Cornwall, the lead of the Pennine Chain, and the bog-iron ore which occurred almost all over the country. During the Saxon and the subsequent Norman periods the rearing of sheep for wool became the staple industry of England, there was little manufacture, and the country remained a producing area for raw materials. The "woolsack," the official seat of the Lord Chancellor as president of the House of

Lords, dates from this period. Later, when root-crops were introduced and the methods of agriculture improved, the leading occupation became once more grain-growing and cattle-rearing. As the country grew peaceful and became an asylum for the oppressed industrial peoples of the continent, handicrafts of every sort, and particularly weaving, acquired importance, and England began to export manufactured goods. Iron works were early established in all places where ore was found in the neighbourhood of forests from which charcoal could be made for its reduction. In the eighteenth century coal was discovered to be fit for use in making iron, and the first movement of iron-works to the coal-fields of the north commenced. The streams of the Pennine Chain, the Cotswolds, and other hilly districts were from early times utilised for the supply of mechanical power in mills. On the invention of spinning and weaving machinery in the eighteenth century new textile factories were started in the valleys of the northern rivers, and when at the beginning of the nineteenth century steam-power was introduced, the prosperity of the industrial villages already situated on the coal-fields was increased, and the other manufacturing industries of the country were attracted to the same regions. Subsequently the introduction of railways drew some of the manufactures back to the great seaports; and now the use of electricity in manufactures has restored and multiplied the value of water-power, and promises renewed prosperity to the highlands of high rainfall and full rivers. As the volume of the manufactures swelled, the need for improved communication with seaports led to the initiation of the system of barge-canals which make a close network over the central plain of England, and also cross the midland plains of Ireland and Scotland. The introduction of railways deprived the canals of their importance and introduced new adjustments of centres of production. In every one of those changes the control exercised by geographical conditions is to be traced, varying in its character from one period to another.

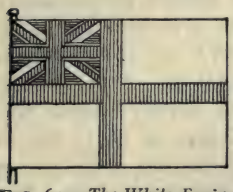

FIG. 64.—*The White Ensign—the flag of the British Navy.*

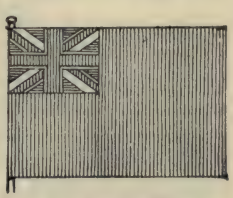

FIG. 65.—*The Red Ensign—the flag of the British Merchant Service.*

Up to the middle of the nineteenth century the agricultural produce of the country nearly sufficed for the food-supply of the people; but as the improvement in machinery and means of communication by land and sea enabled the manufactures of imported raw material to be increased, and cheapened the cost of foreign food-supplies, from which the protective tariffs had been removed, agricultural labourers began to be attracted to the factory work of the towns, land went out of cultivation as the farmers found it impossible to compete with the cheap foreign corn, and many were driven to emigrate. The tide of emigration was enormously

increased in Ireland by the failure of the potato-crop, on which the people depended, and the result now is that all but a fraction of the food-supply of the nation has to be imported and paid for in manufactured goods, or in services rendered by carrying on the shipping-trade of other countries. If supplies from over-sea failed the reserve of bread-stuff in the British Islands would not last for a month. This is the secret of the unique importance of foreign trade to the United Kingdom, and of the necessity for holding the command of the sea at all costs.

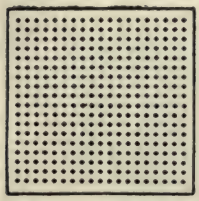

FIG. 66.—*Average population of a square mile of the United Kingdom.*

In 1891 one third of the British people above ten years of age were engaged in manufacturing industries and less than one tenth in agricultural work.

Distribution of Population.—The average density of population for the British Islands was 344 per square mile at the Census of 1901; but in England, which contains three-quarters of the whole population, the density is 558 per square mile. The bare and unproductive Highlands are almost uninhabited, the density of population in Sutherlandshire being only 11 to the square mile. The pastoral regions are as a rule the most thinly peopled, the agricultural districts somewhat more thickly, while an enormous density of population is found on the mineral fields and in the neighbourhood of certain seaports (Fig. 18).

Agriculture.—Three-quarters of England and Ireland, nearly two-thirds of Wales, and one-quarter of Scotland are occupied as farms and pastures; more than half being pasture land. The grain most largely

Average population of a square mile—

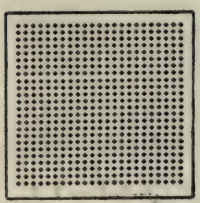

FIG. 67.—*England & Wales.*

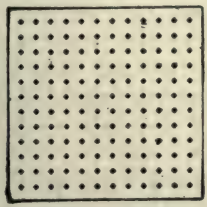

FIG. 68.—*Ireland.*

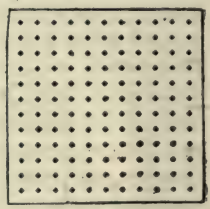

FIG. 69.—*Scotland.*

cultivated is oats, next to which come barley and wheat. The cultivation of oats is carried on mainly in the north and west, where the rainfall is great and the temperature not extreme; in these conditions wheat-growing is impracticable. The great wheat-growing region is in the east of England, where there is a clay soil, a relatively extreme climate and small rainfall. Turnips and potatoes are the next most important crops; the only industrial plant cultivated on a fairly large scale is flax in the north of Ireland. Hops are grown in Kent and some other parts of the

country, and apples in the west of England. Market gardens and fruit farms—growing plums, pears, strawberries, gooseberries, &c.—are found near all large towns. The live-stock are principally sheep on hill pastures, cattle on the richer grass of the plains, especially in the districts of high rainfall, horses, and pigs. Dairy farming is important, but little attention is given to the rearing of fowls.

Fisheries.—The fisheries in the North Sea are of great value, but those on the west coast and in Ireland are comparatively neglected. Salted herrings form one of the minor British exports. The introduction of steam trawlers has led to the concentration of fishermen at large ports with good railway facilities, such as Aberdeen and Grimsby, and to the gradual depopulation of the fishing villages which formerly fringed the whole east and south coast, thus reproducing the effects of the introduction of steam-power in manufactures.

Mining.—The extraction of copper, tin, lead and zinc is now quite insignificant. Silver and gold are obtained in small quantities, but the only metal worth considering is iron, ten times more valuable in its annual production than all the rest put together. It is mined mainly as clay-ironstone in the Cleveland district of Yorkshire. Better qualities in smaller amount occur in the Coal Measures, and can often be mined together with the coal; but the finest ore is the red hematite of the south-west and west of the Lake district. The great demand for iron requires so large an import of ore that more than one half (in value) is brought in from abroad, mainly red hematite from the north of Spain.

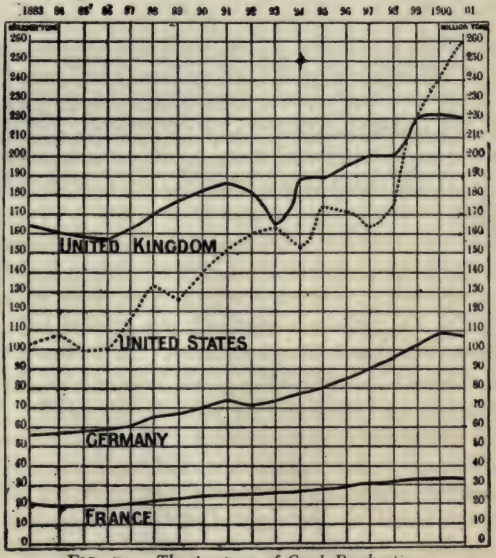

FIG. 70.—*The progress of Coal Production.*

Coal stands alone as the most valuable product of the United Kingdom, the only commodity none of which has to be imported; and, at the present time, the material basis of the prosperity of the country. Its production has increased with remarkable rapidity, only 82,000,000 tons having been produced in 1860. The recent output is compared with that of other countries in Fig. 70. It is coal which makes it possible to purchase grain and other food materials; not directly, however, for only 33,000,000 tons of the 190,000,000 tons annually raised are exported; but indirectly by

supplying smelting furnaces for reducing iron and providing power for engineering works and factories. The outputs of coal in the four chief divisions of the country stand in the proportion of England 71 per cent., Scotland 15 per cent., Wales 14 per cent., and Ireland a minute fraction. The chief coal-producing districts are named in the following list with the output in 1896.

(1) *The Northern Coal-field* in Northumberland and Durham (42 million tons) near the Cleveland iron ore, is important mainly for the engineering works at Newcastle, and for export to Scandinavia and the Baltic.

(2) *The Yorkshire Coal-field* on the eastern slope of the Pennine Chain between the Aire and the Trent is shared by the East Riding, Nottingham, and Derbyshire (41 million tons). It supports the engineering works of Leeds and Sheffield, and is the seat of the woollen weaving industry.

(3) *The Lancashire Coal-field*, lying symmetrically on the west side of the Pennine Chain (23 million tons), only supplies the engineering works and cotton factories of Lancashire centred round Manchester.

(4) *The Staffordshire Coal-fields*, raising 13 million tons, furnish supplies to two industrial districts, the "Potteries" and the "Black Country," where the iron industry and metal manufactures centre in Birmingham.

(5) *The South Wales Coal-field* (32 million tons) stretches into the county of Monmouth, and supplies the iron and copper furnaces of Cardiff, Merthyr Tydfil, and Swansea. The coal is mainly anthracite, of great value for producing intense heat with no smoke, and fully one-half of the supply is exported for use on steamers in all parts of the world.

(6) *The Scottish Coal-fields* (29 million tons) scattered throughout the central lowlands, touch the sea on the Firths of Clyde and Forth, exporting to Ireland and the Baltic. They supply the iron furnaces near Glasgow and the steel shipbuilding yards on the Clyde.

Seaports.—The present commercial supremacy of the United Kingdom is not due to the number and commodiousness of its natural harbours, although this is frequently stated. The best natural harbours are remote from the regions of dense population and they are not useful. Another common error is to ascribe the great trade to the fact that the south of England is nearly in the centre of the "land hemisphere"; but if this were a potent factor it would act much more powerfully on the trade of France, which possesses by far the most central position on the ocean routes of the world. The real reason must be sought in the spirit of the British people, and in the abandonment of protective tariffs, making it necessary to import food and raw material, and to pay for imports by trade. Eight groups of ports carried on between them 80 per cent. of the trade of the United Kingdom with foreign countries in 1896.

(1) *London*, with about 16 million tons of over-sea shipping, owes its pre-eminence to the historic continuity of the capital as the chief nucleus of population, and to its now being the centre of means of distribution inland. The exports are inconsiderable.

(2) *Liverpool*, with a movement of 12 million tons, is unique amongst British seaports for its practical monopoly of the American and West African trades, especially in the import of food and raw material, chiefly cotton, and for its export of manufactured goods and machinery. The harbour is an estuary deepened and kept open at great cost.

(3) *Cardiff* (including Barry Dock), with 12 million tons of shipping, prospers by the enormous export of coal from the South Wales coal-field.

(4) *The Tyne Ports*, including Newcastle and North and South Shields, have a movement of 9 million tons, mainly exporting machinery and coal.

(5) *Hull and Grimsby*, on the Humber, with about 7 million tons of

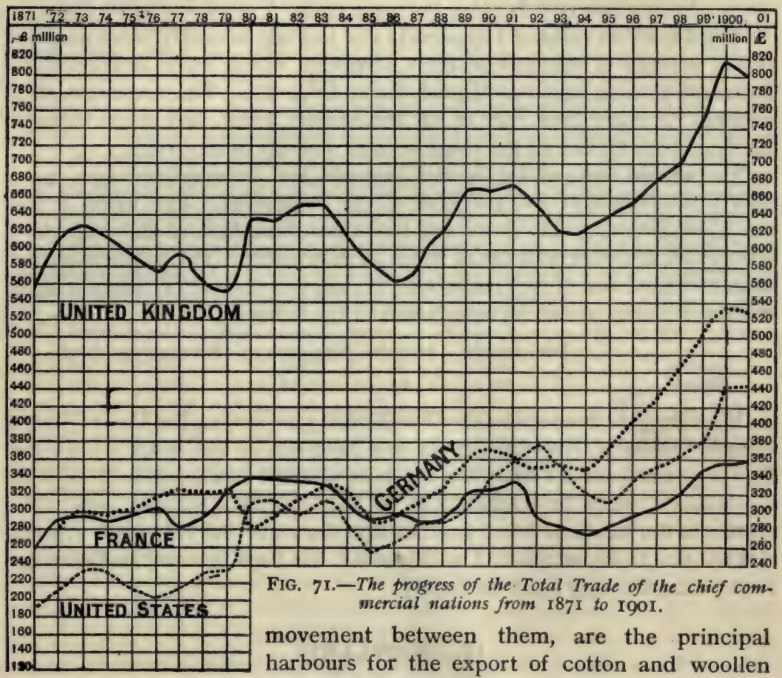

FIG. 71.—*The progress of the Total Trade of the chief commercial nations from* 1871 *to* 1901.

movement between them, are the principal harbours for the export of cotton and woollen goods to the continent of Europe, and in a minor degree for the import of continental produce.

(6) *The Firth of Forth Ports*, Leith, Grangemouth, and Kirkcaldy, have between them about 6 million tons of movement, mainly exporting coal.

(7) *Glasgow*, with a movement of 3½ million tons, is an artificial port on the Clyde, ocean steamers now coming to a point where fifty years ago children could wade across at low water. The trade is largely in imports of ore and raw materials, and the export of iron and manufactured goods.

(8) *Southampton*, with a movement of 3 million tons, is mainly con-

cerned in the passenger trade to South Africa and America ; its proximity to London by rail enabling it to compete in this respect with Liverpool.

It will be noticed that almost the whole trade of the United Kingdom with other countries is carried on in four inlets of the east coast (the Thames, Humber, Tyne, and Forth) three on the west coast (the Bristol Channel, Mersey, and Clyde) and one on the south coast. But in addition the importance of Dover, Folkestone, Queenborough, and Harwich as passenger and light cargo ports for cross-channel trade must be remembered. The coasting shipping of the country is also greatest in the harbours which concentrate the over-sea trade, and its volume is about the same. Fully 1,000 vessels enter the ports of the United Kingdom daily.

Trade.—The value of the exports and imports is nearly twice as great as the average of that of the three countries which come nearest to it, Germany, France, and the United States (Fig. 71). The merchant fleet amounts to more than half of all the vessels afloat, and their tonnage much exceeds that of all the ships of other nations in the world.

The annual trade of the country (exports and imports) averages more than £700,000,000, or £18 per head of the population. The value of the exports of British goods is scarcely more than half that of the imports, a proportion which prevails in no other large country. The imports consist mainly of food and of raw materials, the exports mainly of manufactured articles as nearly as can be ascertained in the following proportions :—

	Food material.	Animals.	Raw materials.	Manufactures.	Total.
Imports	40·7 ..	2·5 ..	35·3 ..	21·5 ..	100
Exports	5·3 ..	0·4 ..	7·8 ..	86·5 ..	100

Most trade is done with the other British possessions, the United States, France, Germany, Holland, Russia, and Belgium, in the order given ; the British possessions are relatively the most valuable as a market for exports.

Railways were first introduced in the United Kingdom, and they remain in the hands of a few great companies ; but the telegraph system, also the first to be established in the world, has been incorporated with the Post Office, the only State monopoly.

II.—SCOTLAND

By Hugh Robert Mill, D.Sc.

General Characteristics.—North Britain is divided naturally into three parts—the Highlands to the north and west, the Central Lowlands and the Southern Uplands to the south and east. The boundaries of these areas are marked by nearly straight parallel lines of faulting running from north-east to south-west (Fig. 72). Between these faults the crust-block of the Central Lowlands has gradually sunk, protecting the Carboniferous strata, while those of the Highlands and Southern Uplands have been elevated on either side, and the very ancient rocks exposed by denudation. The existing scenery of Scotland, perhaps more than the other parts of the

British Islands, shows traces of the Glacial Period, when the land was buried in ice, the movement of which polished and striated the rocks of mountain and valley alike, and covered large parts of the country with masses of boulder clay. This gives a gently undulating character to much of the Central Lowlands, and has, by filling old river channels, caused a rearrangement of many of the river courses. The work of frost and rain has carved the Highland summits into characteristic forms of rugged strength. One of the most recent geological features is the series of raised beaches which surround Scotland. Of these the most important is a horizontal terrace about twenty-five feet above sea-level, sometimes cut in the solid rock, more often built up of pebbles and clay, which furnishes the sites for almost all the coast towns.

FIG. 72.—*Natural divisions of Scotland.*

History and People.—The Scots, a Keltic race from Ireland, entered the country from the west, gradually overspread it in the fifth century, and conquered the earlier Picts. It was not until after the tenth century that the English language in its Northumbrian form was fully established on the Lowland plain and the unassimilated Gaels began to draw back within the Highland border. There the clans lived under their chiefs as a typical race of mountaineers, often at war with each other, and as distinct in dress and language from their fellow-countrymen in the Lowlands as from their national enemies in England. The suppression of the rebellion in 1745 broke up the Clan system finally, and since that time the Gaelic language has been less and less spoken. The eastern portion of the Lowland plain formed for a long period a part of the kingdom of Northumbria, which spread from the Humber to the Forth; but the bare hills of the Southern Uplands were a barrier to the easy communication necessary to maintain cohesion in unsettled times, and well suited to form the marches or borderland between two States. The fertile carse-lands of the eastern firths naturally became the heart of the kingdom of Scotland. The long-continued wars with England drove Scotland into closer association with continental countries, the influence of France being very marked for several centuries. For a century after the union of the crowns Scotland retained its own parliament, and was separated from England by Customs barriers for a longer period. The opposition of English mercantile corporations hampered Scottish trade, and brought disaster on the splendid though premature project of colonising the isthmus of Darien in order to command the trade of the Pacific. With the union of the parlia-

ments the economic development of the country really commenced. At present the chief external difference between Scotland and England lies in some details of law and the administration of justice, and in the establishment of a Presbyterian church. The national character is marked and distinctive. The Highlander is constitutionally courteous, poetical, and open-handed, and prefers an occupation involving occasional calls for severe exertion with longer intervals of inactivity, such as fishing and cattle rearing. The Lowland Scot, on the other hand, is sometimes surly but always independent, persevering, and determined in his undertakings, and given to agriculture, manufactures, and trade. As a consequence of the adverse conditions against which his race has so long struggled he is often more thrifty than generous. Since John Knox inaugurated the parish schools at the Reformation three centuries of practically universal education have given the Scottish peasantry a bent for study and a taste for serious reading which make the Scottish universities perhaps the most numerously attended in Europe.

The Highlands.—The north-west of Scotland bore the brunt of the compressing forces in the Earth's crust by which the European continent was ridged up from the Atlantic depression, and its geology is consequently very complex. Since the up-ridging, continual erosion has worn down many of the islands of the outer Hebrides to a low level, although composed of the hard Archæan gneiss. Great volcanic disturbances also occurred through many geological ages, resulting in the outpouring of lavas and the injection of sheets of molten rock, which denudation has uncovered and rendered conspicuous. The average level of the Highlands is about 1,500 feet above the sea, although in parts they rise to nearly three times that height. There is no mountain range. The surface has been carved by rivers and atmospheric erosion into masses, which looked at from below have the appearance of mountains; but viewed from one of the highest summits the Highlands appear as round-shouldered and flat-topped moorlands covered with moss or heather or shattered stones. They are of fairly uniform general height and rise without definite order like waves on a stormy sea. They are, in fact, the product of a deeply incised system of valleys impressed upon an ancient plateau, the recent depression of which on the west has formed the islands. Highlands and islands together comprise 70 per cent. of the area of Scotland, but only contain 23 per cent. of the population. Most of the crofters who formerly made a precarious living by farming in the valleys have been compelled to migrate to more fertile lands or engage in more profitable callings. The high rainfall of the west, the raw climate, and the poor soil of the crystalline rocks unite to make agriculture impossible; and the Highlands have relapsed into the condition of a wild country, useful mainly as a game preserve, and now for the most part the property of wealthy Englishmen and Americans. Sheep farming on a large scale is still carried on, but deer forests are more profitable. The population is almost entirely confined to the lower

parts of the valleys where they come out on the Lowland plain or on the sea. The roads through these valleys are now in many cases superseded by railways carrying the yearly swelling tide of sportsmen and lovers of the picturesque to moor, mountain, and loch. Whisky distilling is a typical Highland industry; the most famous distilleries are often situated in small villages, and *Campbellton* in Cantyre is almost the only town of which distilling is one of the chief resources.

The North-Western Highlands and Islands.—Some of the lakes in the western valleys are of remarkable beauty, especially those in the west—Loch Maree, Loch Shiel, and Loch Morar, the last being the deepest lake in the British Islands (maximum depth 1,070 feet). The picturesque masses of volcanic rocks forming Skye, Mull, and the smaller islands of the Inner Hebrides are separated from the mainland by drowned valleys. The population is found chiefly on the fertile wedge of Old Red Sandstone lowland surrounding the Cromarty Firth on the east coast. The Highland railway winds its way northward along the east coast, and a branch line from *Dingwall* at the head of the Cromarty Firth runs across to Strome Ferry on Loch Carron, whence steamers ply to the herring-fishing port of *Stornoway*, in the island of Lewis in the Outer Hebrides. Part of Inverness and the county of Ross and Cromarty united occupy most of the area; but Sutherland (the Southern Land of the old Norsemen), includes the northern end of the Highlands.

The Northern Lowlands and Islands.—Beyond the north-western Highlands the Old Red Sandstone plain of Caithness is really a detached portion of the fertile Lowlands, better cultivated and more densely peopled than the Highland counties. The coast scenery is fine, and the fisheries important, especially at *Wick*, for herrings. From *Thurso* the mail steamer sails for Orkney. Orkney and Shetland, though forming one county for parliamentary purposes and having come under the Scottish crown together in 1590, are entirely distinct. The **Orkney** islands are a continuation of the Old Red Sandstone plain of Caithness, separated from it by the Pentland Firth, their only striking scenery being on the coast. The tide rushes furiously through the narrow sounds which separate the numerous islands; and the Orkney people are very skilful boatmen. Sheep are raised, and fishing and some woollen manufactures are carried on. *Kirkwall*, on Pomona, the largest island, is the chief town. The **Shetland** group, fifty miles north-east of Orkney, are much more varied in character; their rocks resemble those of the Highlands, and the people are of more exclusively Scandinavian origin, their dialect containing many words still current in Icelandic. With a climate like that of the Færoes the productions are similar; small shaggy ponies and sheep are reared, there is a good deal of fishing and whale hunting, and a considerable home industry in knitting the fine native wool. *Lerwick*, on Mainland, is the only town. It used to be the last port touched at by Arctic whalers, a large proportion of their crews being Shetlanders; and the islands still produce many sailors. Fair

Isle, half way between Orkney and Shetland, has an important lighthouse.

The Great Glen and South-Eastern Highlands.—The long, narrow valley of Glen More (*i.e.*, the great glen), separates the north-western from the south-eastern Highlands by the clear-cut line of an ancient fracture. The centre of the rift is occupied by a series of long, narrow lakes of great depth, which never freeze, Loch Ness, Loch Oich, and Loch Lochy. They are joined by the Caledonian canal, which is now of value only as a tourist route. The historical importance of this valley is attested by the growth of *Inverness* at its north-eastern outlet. The continued prosperity of Inverness is due not so much to the beauty of its situation as to the fact that it stands at the crossing of the tourist routes of the Highland railway and the Caledonian canal. It has become a distributing centre for the whole north of Scotland, and a noted sheep market. The names of three old military posts recall the strategic value of the Great Glen in the past : *Fort William*, established at the west end of the Glen in 1655 ; *Fort Augustus*, in the centre, after the rebellion of 1715 ; and *Fort George* at the east end, after the rebellion of 1745. Ben Nevis (4,406 feet), the highest point in the British Islands, is crowned by a meteorological observatory. The Falls of Foyers on Loch Ness have been utilised for the production of electric power for an aluminium factory, a foretaste of the possible revival of Highland industries by modern methods.

The highest land, representing the ridge of the old plateau, is marked by the granite masses of Ben Nevis and Ben Macdhui (4,300 feet), in which the longest rivers in Scotland originate. The Spey runs north-eastward to the Moray Firth ; the Dee and Tay (the latter carrying the outflow of the large lakes — Lochs Ericht, Rannoch, Tay, and Earn) flow to the east and south-east. Their valleys furnish the only lines of communication for roads or railways across the Highlands. The large Loch Awe of the west resembles in a general way the salt water fjords of Loch Etive and Loch Fyne between which it lies. From the Central Lowlands the edge of the Highlands presents an imposing appearance like a line of mountains rising from the plain, and to this edge the name of the Grampians has been vaguely applied. Near the great fault separating the Highlands from the Lowlands, small earthquakes are common, a sign probably that the strata are still yielding to the internal stresses.

South-Eastern Highland Counties.—The county of Inverness occupies the north, that of Argyll the whole west, and Perth the south of this division of the Highlands. The northern slope to the Moray Firth terminates in a narrow coastal plain shared by the counties of Nairn, Elgin, and Banff. Thanks to the porous soil of the west of this plain, and its sheltered position, it possesses a remarkably dry and mild climate. Where the coast turns to face the east, and the Highland schists and granites reach the sea in grand cliffs, the seaport of *Peterhead* was long famous for its Arctic

whaling fleet. The exposed bay is being converted into a great harbour of refuge for the east coast by the construction, with the aid of convict labour, of huge breakwaters which will not be completed until 1921. *Aberdeen*, the largest town on Highland soil, owes its prosperity in part to the quarries of fine grey granite, of which the whole city is built, in part to its ancient university, but mainly to the harbour, which, in spite of an awkward bar at the mouth of the river, is growing in importance. It is concentrating the fishing industry, now largely carried on by steam trawlers, and gradually attracting it from the small fishing towns along the coast. This is, in part, due to the good railway service to London (500 miles in eleven hours), with which Aberdeen also does a large trade in fresh beef, the cattle of the district being renowned.

The Central Lowlands.—The Central Lowlands are on the whole under 500 feet in elevation, the lowest divide between the North Sea and Atlantic being only 200 feet above sea-level. The Firth of Clyde, on the west of the plain, is connected with a series of long fjords running northward and north-eastward into the Highlands, but receiving no streams of any length. Loch Lomond, picturesquely situated near the west coast on the edge of the Highlands, combines the character of a highland valley loch with that of a lowland lake, Loch Leven in Fife shows the latter type alone. The lower ground is composed of the Old Red Sandstone formation on the northern and southern margins, with Carboniferous strata in the centre containing numerous detached basins of the Coal Measures. Great accumulations of volcanic materials form ranges of hills parallel to the general lines of the country, especially the Sidlaws, Ochils, and Campsie Fells on the north, and the Pentlands, and Lammermoors on the south. The Lowland plain contains much more than half the population of Scotland; for on account of its diverse natural advantages it has always been the richest part of the country. The fertility of the soil, and the development of the most advanced scientific farming, enables remarkably heavy crops to be raised. The iron and coal-fields have fixed important industries, and caused the growth of many active towns, knit together by a close network of railways.

The Highland Border.—The county of Perth, almost co-extensive with the drainage area of the river Tay, includes the system of converging river valleys which drain the southern Highlands, and bring all the lines of communication with the north to a focus at the city of Perth, where it stands on a flat plain bordering the Tay at the head of the tide. *Perth* has always been important on account of its commanding position; for from it diverge the roads (and now the railways) to the Highlands by the valley of the Tay, to Aberdeen by the plain of Strathmore north of the Sidlaws, to Dundee by the fertile Carse of Gowrie, to Stirling by the Allan valley skirting the Ochils on the west, and to Edinburgh by the pass of Glenfarg across the Ochils, through which the construction of the great Forth Bridge has restored modern traffic to the old coach route. Besides its importance

as a railway centre, there are some industries, especially extensive dye-works. *Stirling* grew round the steep basaltic crag on which its castle stands commanding the lowest ford on the river Forth, close to the head of navigation, and at the point where it could first be bridged. Stirling Bridge was for centuries the key to the Highlands, and the immediate neighbourhood was consequently the scene of many battles, chief amongst them that of Bannockburn in 1314, when Scottish independence was finally assured. *Dundee*, with the only harbour for sea-going vessels on the Tay estuary, is a commercial and manufacturing town. As a linen-weaving centre dependent on Russian flax the Crimean war nearly ruined it; but the timely introduction of Indian jute more than compensated the temporary loss, and the American civil war, by stimulating the production of all other textiles than cotton, confirmed its prosperity. Dundee has famous jam factories, partly supplied by the fruit farms of the Carse of Gowrie, and it is the only port of the United Kingdom still sending out a fleet of Arctic whalers. The Tay Bridge, two miles in length, gives direct communication with the south *viâ* the Forth Bridge.

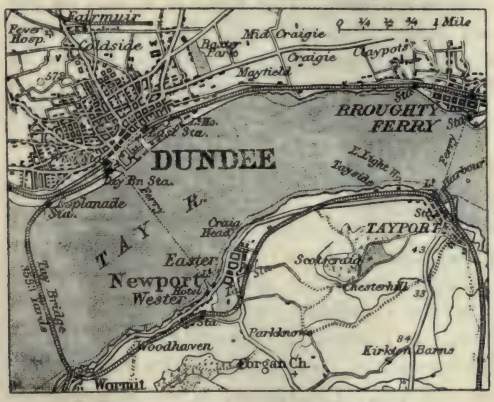

FIG. 73.—*Dundee and the Tay Bridge.*

The Eastern Lowland Towns. — The peninsula of Fife between the Firths of Forth and Tay was compared by James VI. to "a beggar's mantle fringed with gold" on account of the number of prosperous seaports along its coast. There are still many fishing villages, but the only harbours for steamers are *Burntisland* and *Kirkcaldy*, the latter the chief centre of linoleum manufacture in Great Britain. The ancient city of *St. Andrews*, with the oldest university in Scotland, founded in 1411, stands on the shores of a sandy bay in the extreme east, where the links made it famous centuries ago, as it is famous still, for the "royal and ancient game" of golf. *Edinburgh*, originally a castle on a lofty crag (see section from west to east in Fig. 25), grew into a walled town, the one street of which, with branching "wynds" and "closes," descended the steeply-sloping "tail" to the later palace of Holyrood. Within the last century the space around the castle and Calton Hill has been laid out in streets and squares which stretch to the shore of the Firth of Forth, and suburbs also spread far to the south. Edinburgh retains the supreme courts of Scotland, and other survivals of its life as a capital.

The university is the youngest in Scotland (1582), and is renowned mainly for its medical school. Book printing and brewing are among the more important of the industries of the town. As the headquarters of many banks and insurance offices it is of financial importance, and the General Assemblies of the Scottish churches make it an ecclesiastical centre also. The grandeur of its site, and the bold design and fine architecture of the streets and public buildings, make it in the opinion of many the finest city in Europe. The adjacent seaport of *Leith* does a large shipping trade.

The Western Lowland Towns.—The centre of the Lowland plain is engaged in the characteristic industry of oil-shale mining, and the distillation of paraffin. Further west the coal-mines yield more than half the output of Scottish coal-fields, most of which is employed in the many

FIG. 74.—*Edinburgh and the Forth Bridge.*

manufactures of the densely peopled counties of Lanark and Renfrew. The black-band iron-stone occurring with the coal gives employment to the blast furnaces of Hamilton, Wishaw, Coatbridge, Kilmarnock, and Cumnock. The industry of the region is concentrated on the upper estuary of the Clyde where *Greenock* is an active seaport with ship-building yards, and *Paisley*, though standing back from the river, is even more prosperous through its great manufactures of cotton thread. *Glasgow* is one of the most ancient cities in Scotland, and the seat of an old university. At one time its importance, like that of Perth, lay largely in its situation on the border of the Highlands, but its present prosperity, which has made it the largest British city next to London, is due to the artificial deepening of the Clyde, commenced in 1768. The proximity of iron and coal promoted manufactures of every kind, the navigable waterway enabled trade-relations

to be established with America and India, and the introduction of steam in navigation, and of iron and then steel in naval construction united these advantages. Steel ship-building is the most important industry of the Glasgow district, and the Clyde is the greatest ship-building centre in the world. Locomotive works, chemical works, and potteries, as well as textile factories of all kinds, employ the large industrial population. The city of Glasgow is one of the most progressive municipalities in the United Kingdom. The water supply is drawn through a tunnel 34 miles long from Loch Katrine.

The Southern Uplands.—The Southern Uplands rising steeply from the Lowlands form a region of round-topped hills of Silurian formation, usually richly grassed to the summit. The general character is that of a plateau deeply trenched by valleys, with an average height of perhaps 1,000 feet and only 2,700 at its highest point—Mt. Merrick. The Tweed flowing east by south is the principal river, and its lower valley forms a flat plain of considerable extent near the coast. The Clyde, rising near the source of the Tweed, flows on the whole west by north to its estuary in the Central Lowlands. The Annan and other short streams flow to the Solway Firth. The south-western corner of the Uplands is its highest and most rugged part, forming the district of Galloway. It is mainly a land of sheep farms, and in proportion to the area Roxburgh, Selkirk, and Berwick contain more sheep than any other counties in the United Kingdom. The sheep are usually of the Cheviot breed, celebrated for their fine wool, and the towns of the Tweed valley, especially *Galashiels*, have long been prosperous through the weaving of strong woollen cloth. The old divisions of the border country were the dales or valleys of the rivers which formed the natural highways and contained the best farming land.

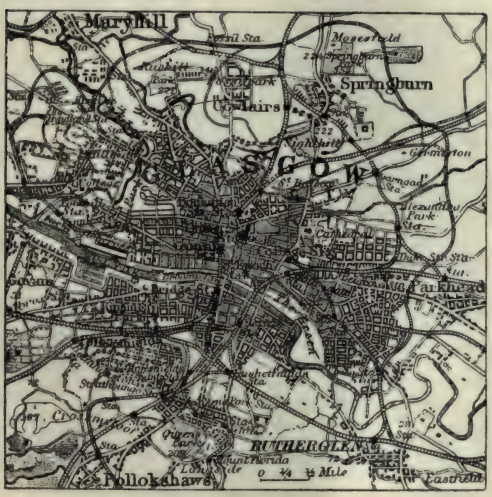

FIG. 75.—*Glasgow.*

Railways from England enter the Uplands at Berwick on the east, winding round the coast to Edinburgh, and from Carlisle on the west, whence one line of the Glasgow and South-Western railway runs round the coast to *Stranraer* on the shortest sea-passage from Great Britain to

Ireland. Another passes *Dumfries* and goes up Nithsdale, descending to the coastal plain, and passing *Kilmarnock* to Glasgow. The Caledonian railway passing *Gretna Green* (formerly famous for the celebration of runaway marriages, as it was the nearest point to England where the Scots law could be taken advantage of), ascends the valley of the Annan and descends that of the Clyde to Glasgow. The North British "Waverley Route" passes up Liddesdale and descends the valley of the Teviot, crossing the Tweed at *Melrose*, and running thence direct to Edinburgh.

FIG. 76.—*Section across England (after Ramsay). The letters* o *and* c *indicate the Oolitic and Chalk escarpments.*

III.—ENGLAND AND WALES

BY HUGH ROBERT MILL, D.Sc.

Natural Divisions.—A bold contrast presents itself between the scenery and structure of the country to the east and to the west of a slightly curved line, convex to the east, drawn from the mouth of the Tees in Durham to the mouth of the Exe in Devon. This is not an "imaginary line" but a distinct height of land, the Oolitic Escarpment, forming a watershed throughout its whole length, except in one point where the Humber estuary breaks through it. The western hills are lofty, rising like islands out of the low plain which surrounds them, and often wild and rugged like those of the Highlands, contrasting with the low and gentle downs and escarpments of the eastern lowland. The western rocks are for the most part of Palæozoic or igneous formation, occurring in irregular and confused masses, in contrast to the uniformly overlapping sheets of little-disturbed Secondary and Tertiary formations to the east. The western region falls into four fairly definite physical divisions which have also a cer-

FIG. 77.—*Natural Divisions of England and Wales.*

tain historical and industrial individuality, the *Lake District*, *Wales*, the peninsula of *Cornwall and Devon*, and the *Pennine Chain*, to which may be added the *Central Plain* which surrounds and separates them. The eastern region is less sharply subdivided, into the *Jurassic Belt*, the *Chalk Country* which is broken by the *Fenland* and the *Weald*, and the *Tertiary Basins* of Hampshire and London (Fig. 77).

General Characteristics.—England is distinguished from Scotland and Ireland by the more purely Teutonic descent of its people. The Saxon type is still to be seen in great purity in the southern and eastern counties, even traces of the old German language remain amongst the peasants, who in Sussex still use "Ya" (the German *Ja*) for "Yes." The local dialects of most parts of the country are distinctive, but not so different as to hinder free intercommunication. The whole of England and Wales is divided ecclesiastically into two Provinces presided over by the Archbishops of Canterbury and York, and into thirty-two Bishoprics, each with its cathedral city. The rank of *city* in England is only given to the seat of a cathedral. The forty "ancient counties" or shires into which England is divided, represent very early divisions of the old Anglo-Saxon kingdoms, which coalesced to form the realm of England. Few of them have natural boundaries; but it is interesting to notice as exceptions that the Thames separates counties along nearly its whole course, the Tamar, Tyne, and Tees are also county boundaries, and Yorkshire consists almost exactly of the basin of the Ouse. For administrative purposes the larger counties are subdivided, and large towns as a rule are counties in themselves. The County Council is the chief local government body. The character of the English people is the foundation of that of the British nation. The sense of justice is strongly developed, and the love of "fair play" for friends and enemies alike is perhaps the real basis of British greatness; but this feeling is combined with a strenuous determination to uphold rights: "Dieu et mon droit" is not inaptly the national motto. New ideas are slowly received, but once accepted they are strongly held. Interest in manly sports is deeply rooted and forms the strongest bond between all classes of the community.

The Western Division.—In the time of the Roman occupation the mountainous region of Britain west of the Severn, including the peninsula of Cornwall and Devon on the south, and the Lake District and Southern Uplands of Scotland on the north, was occupied by Keltic tribes, amongst whom the *Brythonic* or *British* predominated over the Gaelic and other elements; so the Gaelic language does not occur in Wales. The people called themselves *Cymry* (*i.e.* fellow-countrymen), hence the name of *Cumber*land. *Wales* is from a Saxon word meaning "foreign," and the name reappears in Corn*wall*. The tribes were organised in warlike clans, the chieftains sometimes united under a common head, more frequently at war with each other, and they resisted conquest until the Norman period. The northern districts have now completely lost their Keltic population and language,

and so has the southern peninsula, although the old Cornish language lingered there until the eighteenth century. Wales was incorporated with England in the fourteenth century, yet the Welsh language has survived, and one-third of the people of the principality can speak no other. The Welsh are lovers of music, the harp being a favourite instrument.

The Lake District.—The Lake District forming a peninsula between the Solway Firth and Morecambe Bay, and separated from the Pennine Chain by the valleys of the Eden and the Lune, is a small rugged highland trenched by deep and picturesque valleys which radiate in all directions from a central point. Each long valley contains a narrow lake-bed; but some have been separated into two by silting up like Derwentwater and Bassenthwaite, or Buttermere and Crummock, others like those of Langdale have been entirely drained or filled up and converted into meadows. The largest remaining lakes are Windermere running south, and Ullswater running north-east. Scafell Pike, above Wastwater, the deepest lake, is the highest mountain in England (3,200 feet); Skiddaw in the north, and Helvellyn in the east also exceed 3,000 feet. Geologically the Lake District consists of a central mass of Silurian volcanic rocks, with sedimentary strata of the same age, to north and south; surrounded by a ring of Carboniferous limestone, with Coal Measures on the north-west, and a broken rim of newer rocks—the New Red Sandstones—outside the whole.

In the central valleys the population has always been sparse, the extremely wet climate makes agriculture impossible, and only a few cattle and sheep are kept. Plumbago mines in Borrowdale gave rise to the manufacture of pencils at *Keswick*, and this industry continues although the mines have been exhausted; graphite is now imported from Ceylon, and the cedar for the sticks is brought from Florida. The romantic beauty of the Lake District attracted attention about the middle of the eighteenth century, and ever since it has been a haunt of tourists. It is a favourite residence for poets, artists, and men of letters, who have striven to introduce home industries in order to retain the small population in their native dales. On the outer margin coal is mined, and the remarkably pure hematite iron ore has caused the artificial harbour of *Barrow-in-Furness* to spring into prosperity in the south-west. The heavy rainfall of the district is utilised by the conversion of Thirlmere into a reservoir for the water supply of Manchester, and some of the streams are utilised for producing electrical energy.

Wales.—Wales as a physical region comprises the peninsula between the estuary of the Dee and the Bristol Channel, and extends on the east to the Severn valley, but the counties of Cheshire, Shropshire, Hereford, and Monmouth have long ceased to be Welsh; Monmouth is, however, usually classed with Wales for statistical purposes. The very ancient rocks known as Cambrian and Silurian were called after the land of the Cymri and Silures, and they form the main bulk of the dissected highland of the peninsula. The north-western and south-western extremities are rendered more resisting by intruded igneous sheets and dykes, and consequently

project boldly, while the more yielding rocks between them have been cut back into the harbourless Cardigan Bay. In Anglesea and Carnarvon on the north-west, the strata and their igneous intrusions run in narrow bands from north-east to south-west. One of these bands gives origin to the channel of Menai Strait which, like that cutting off Holy Island on the west, is so narrow that the harbour of *Holyhead*, lying nearly on the straight line joining London and Dublin, can be reached by rail, and thus used for the mail route to Ireland. Masses of igneous rock have given rise to Snowdon, the highest mountain in Wales (3,570 feet) and other high summits in the neighbourhood, as well as to the fine ridge of Cader Idris (2,930 feet) further south. The slate mountains of North Wales are very extensively quarried, and keep several small seaports at work, as no slate of equal quality is found elsewhere in the British Islands. Both the north and the west coasts of Wales attract many residents and summer visitors on account of their combination of mild climate and fine scenery. In Pembroke on the south the hard igneous rocks run in narrow bands from east to west, and there Milford Haven, the only fjord-like inlet of the coast, is a magnificent natural harbour. Because it lies farther from coal than the tidal harbours of the Bristol Channel, and is remote from the great centres of manufacture and population, it is only beginning to be utilised as a trans-Atlantic shipping port. Around the very ancient rocks of Wales there are several patches of the Coal Measures contained in basins or synclinal troughs. One detached basin runs south from the estuary of the Dee in the north, and others of smaller size appear in the Severn valley, at Coalbrookdale, the Forest of Wyre and the Forest of Dean, each supporting a group of small but busy mining and manufacturing towns.

The South Wales Coal-field.—One great geological basin fills the south and east of Wales, in a synclinal hollow of the ancient Silurian strata, the upturned edges of which running to the north-east originate the striking scenery of Wenlock Edge, and on the east form the singularly graceful line of the Malvern Hills. Within this rim there is a great expanse of Old Red Sandstone rising on the west into the Black Mountains, and reaching an altitude of 2,900 feet in the rugged and barren Brecon Beacons. On the east the Old Red Sandstone sinks to form the low sheltered and exceedingly fertile plain of Hereford bearing the finest orchards in England, and hop gardens rivalling those of Kent. It is watered in the south by the Wye, the most picturesque of English rivers. The plain was formerly of great strategic value, as it commanded the passes into Wales, now its importance appears in providing a "west and north" railway route, in conjunction with the Severn tunnel, from Bristol to Crewe, converging at Shrewsbury with the route by the Severn valley. Within the Old Red Sandstone, between the Brecon Beacons and the Bristol Channel, the Carboniferous rocks are held as in a cup. The South Wales coal-field has an area of 1,000 square miles, and is shared mainly by the counties of Glamorgan and Monmouth. Its perfect basin shape is shown

by the outcrop all round it of the bent-up edges of the Millstone Grit, the "farewell rock" of the miners, and the Carboniferous limestone, which lie under the coal. The Coal Measures form a plateau which descends from an elevation of about 1,200 feet in the north to 700 feet in the south, and then sinks to a coastal plain of newer rocks. It is trenched by remarkably steep-sided and deeply-cut valleys running southward almost parallel to one another. The coal seams crop out along the sides of these valleys, the floors of which are traversed by railways and lined with mining villages, contrasting with the nearly uninhabited uplands between them. The railways converge on the east to the Ebbw valley, at the confluence of which with the Usk the ancient town of *Newport* has become a modern coal-shipping port; and on the west to the far more important Taff valley. Where the Taff enters the coal-field on the north a little village took the name of *Merthyr-Tydfil*, from the martyrdom of an early Welsh princess named Tydfil. In the middle of the eighteenth century coal mines and iron works were established there, and a large though unpretending town has grown on a poor site over 500 feet above the sea. The neighbouring valleys of the Cynon and the Rhondda converge to the Taff, and the output of the whole goes by the Taff Vale railway to *Cardiff*, where there are great docks rendered accessible at high water to the largest vessels by the high tides of the Bristol Channel. Cardiff is the seat of numerous manufactures, mainly connected with iron and tin-plate. Some miles to the west a desolate sandy tract of coast was made the site of a large artificial harbour, *Barry Dock*, in 1889, which now exports an enormous amount of coal, and is the centre of a considerable town. *Swansea* farther west has long been engaged in copper-smelting, ore being imported from all parts of the world, and it is also one of the chief manufacturing places for tin-plate. This industry is carried on in villages in all the valleys of South Wales, the locality being originally determined by the proximity of the coal-field to the Cornish tin-mining district, although now most of the tin is imported from Singapore.

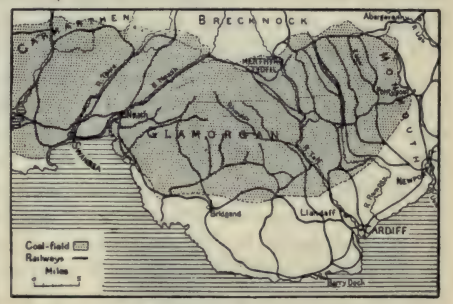

FIG. 78.—*The South Wales Coal-field.*

The Severn Valley.—The rivers flowing down the steep northern, southern, and western slopes of the Welsh highlands are short and swift. On the eastern slope the Dee flows out of Bala lake at the base of the culminating volcanic mass of North Wales, and turns northward to meander over the Cheshire plain. The Vyrnwy, rising close to the source of the Dee, fills an artificial lake formed by the Liverpool water-works in

an ancient lake-bed, in the desolate pastoral region of central Wales, and flows to the Severn. This river, rising farther south and west, sweeps across and around the margin of the ancient rocks to flow southward down its broad valley over Triassic strata, collecting the whole drainage of the eastward slopes of Wales, and receiving only one important tributary, the Avon, on the left from the Central Plain of England. The names of Gloucester, Worcester, and Chester testify to the military importance the Romans attached to the line of communication through the Severn and Dee valleys, flanking Wales. The fine cathedrals of Gloucester, Worcester and Hereford afford evidence of the value of the Welsh border when agriculture was the one source of wealth, and they all continue to be thriving market towns and the seat of various minor manufactures. *Gloucester* is made accessible to ocean-going vessels by a ship canal from the Severn estuary. The commercial importance of this estuary was anciently due mainly to *Bristol*, which grew up as a seaport on the southern Avon, and in the fourteenth century was second only to London. From this port Cabot sailed on his voyage of discovery westward, and a great trade with America was kept up for two centuries in sugar and tobacco; the tobacco trade still continuing important, as well as that in chocolate and in timber. The first steamer to cross the Atlantic sailed from Bristol in 1838, but the introduction of steam has benefited other seaports more, and for a time it declined in importance. There are considerable manufactures, coal being obtained from a small coal-field in the neighbourhood. A tunnel four and a half miles in length, the longest in England, under the Severn, connects Bristol with South Wales.

The Cornwall and Devon Peninsula.—The peninsula of Cornwall and Devon forms a natural region of ancient Palæozoic rocks separated from the newer rocks of the east along a line drawn from Bridgwater Bay to Torquay. It may be viewed as a synclinal trough like those in the south of Ireland, running east and west with Old Red Sandstone strata on the north and south (which derived the alternative name of Devonian from thus occurring), and Lower Carboniferous rocks, not containing any coal, forming the lower ground between. The northern outcrop of the Devonian strata forms a barren upland sloping gently southward from Exmoor, where its highest point exceeds 1,600 feet, but falling steeply to the sea. The coast is picturesque with lofty cliffs and rocky shores dotted with frequented summer resorts at the mouths of short deeply cut valleys. The river Exe flows almost due south from its source, only four miles from the Bristol Channel, to its estuary on the English Channel. The Devonian strata on the south do not stand out so prominently; but they are pierced by several of the greatest outbursts of granite in England, which form prominent uplands. The largest is the plateau of Dartmoor, rising in many points to over 1,500 feet, and in Yes Tor to over 2,000. The surface is wilder and more barren than Exmoor, affording only a little pasture in summer. The granite weathers into clay which allows great marshes and

peat bogs to form. In the centre of the moor in one of the most desolate regions of all England a great convict prison has been established. Separated from Dartmoor by the valley of the Tamar, which runs south to Plymouth Sound, dividing Cornwall from Devon, Bodmin Moor, another granite boss, culminates in Brown Willy, 1,370 feet. A third mass of granite gives character to the Land's End peninsula, its cliffs carved into fantastic forms by atmospheric erosion. Lizard Head is formed by a similar mass of the rarer rock, serpentine. The contact of the granite with the rocks which it pierces marks the richest part for veins of metallic ore, especially copper and tin; the latter is still largely worked, though most of the copper mines are closed. The decomposed granite itself forms China-clay, a valuable product which is not found on the granites of Scotland or northern England, whence all soft material was swept by the ice-sheet. The rocky coast is highly picturesque on account of the diversity of its geological structure, and shelters numerous fjord-like natural harbours and bays. These are evidence that the coast has been undergoing subsidence, which is confirmed by the existence of submerged forests, records of land washed away, and the tradition of the sunken land of Lyonesse between Cornwall and the Scilly Islands. *Penzance*, on Mounts Bay, is the headquarters of the pilchard fishery. *Falmouth* and *Dartmouth* were formerly important harbours. *Plymouth*, standing at the junction of the estuaries of the Tamar and Plym, really consists of "The Three Towns" — Plymouth, Devonport, and Stonehouse. Plymouth Sound, protected by a breakwater, is one of the finest harbours in England, and it is one of the headquarters of the British fleet. The arsenal is protected by an extensive series of modern fortifications. The south coast of the peninsula having the mildest climate in Great Britain, has attracted many residents, and abounds in picturesque health resorts. Of these *Torquay* is the largest and best known. The southern coast-lands are very fertile, and fruit-growing is extensively carried on, especially the growth of apples for cider-making. The low plateau of Lower Carboniferous rocks in the centre of the peninsula has rich grass-land and excels in cattle-raising.

FIG. 79.—*Plymouth Sound.*

The Scilly Islands consist of 140 islets and rocks lying about 30 miles west of Lands End. The larger of the islands are inhabited, and advantage is taken of the exceptionally mild climate to raise flowers and early vegetables for the London market. Here accordingly there is no agricultural depression, and the few inhabitants are prosperous. Communication takes place by steamer with Penzance.

The Pennine Chain.—The Pennine Chain is a backbone to northern England, and its bold configuration determines the river systems of the whole country north of the Tees-Exe line. It is formed throughout of a great anticline or arch of Carboniferous rock, which was originally ridged up from east and west. Rivetted, if one may use a metaphor, to the Southern Uplands of Scotland by the great granitic mass of the Cheviot hills, and numerous long volcanic dykes which run east and west, the Pennine chain extends southward until the heights spread out into finger-like ridges which sink to the level of the English Central Plain, and the Carboniferous rocks dip under the Triassic formations. The Coal Measures, the highest member of the Carboniferous series, have been stripped off the top of the ridge by denudation, leaving the Carboniferous limestones and Millstone Grit exposed; but they appear here and there along its flanks. On the eastern side the great coal-field of Northumberland and Durham occurs in the north, and that of the West Riding of Yorkshire in the south. These are separated from the newer rocks by a belt of Magnesian Limestone running due south from the mouth of the Tyne almost to the Trent, and forming a picturesque escarpment towards the west. On the west side the fault which separates the Pennine Chain from the rocks of the Lake District destroys the symmetry in the north, though the Cumberland coal-field in a way corresponds with that of Northumberland; but in the south the coal-field of Lancashire corresponds closely to that of Yorkshire. The Carboniferous limestone exposed in the northern and in the southern parts of the ridge weathers into very picturesque heights and valleys, and subterranean erosion has formed in it many caverns and underground stream-courses. The highest summits are in the Crossfell group (2,900 feet), overlooking the Eden valley in a grand escarpment, the bold form of which is intensified by an intrusive sheet of basalt; and the somewhat lower but more picturesque uplands of the Peak district (highest summit, 2,800 feet). The middle portion of the chain, formed of Millstone Grit, also weathers into fine peaks of a different type, and grass-covered uplands. It is crossed by a depression between the valleys of the Wharfe and Ribble, the highest point of which only reaches 500 feet. Beyond the limits of the Pennine Chain the Coal Measures, which had dipped below the Triassic rocks, come up like islands as the coal-fields of Staffordshire and Leicestershire, while the coal may be reached in many places by deep mines carried down through the younger overlying rocks. Most of the great manufacturing towns of England are situated on the Triassic plain bordering the Carboniferous uplands. The rivers flowing from the Pennine chain form long valleys, or dales, furrowing the uplands and affording sites for the towns. Their estuaries are important harbours, especially the Ribble and Mersey on the west, and on the east the Tyne, Tees, and the many streams converging from east and south to enter the Humber. Yorkshire, Lancashire and Northumberland, the three chief counties of the Pennine Chain, are known for the sturdy independence,

great perseverance, and industrial capacity of their people. Small towns in picturesque situations and in the neighbourhood of mineral springs have risen into fame as watering places and health resorts; such are *Harrogate*, *Buxton*, and *Matlock*.

The high moorlands are adapted for sheep pastures, and it is natural that the villages and market towns in the sheltered dales should, from an early period, have been engaged in the wool trade and the weaving of woollen goods. The fertile plains surrounding the uplands as naturally became valuable for agriculture and stock-raising. The minerals were worked from early times, but it was not until the era of machinery was introduced by the inventive genius of the people of the district, that the stores of iron and coal localised the greatest seat of textile manufactures in the world. The lines of communication from north to south were necessarily carried along the bordering plains. That on the east ran through the Vale of York and then along the coastal plain, where *Berwick*, with its long bridge over the Tweed, was an important stopping place, and until the end of the fifteenth century was frequently taken and retaken by Scottish and English armies. The North-Eastern Railway now follows this route. On the west the road followed the coastal plain, but turned northward up the Lune valley to *Carlisle*, always an important border town. This is now the route of the London and North-Western Railway, but the Midland Railway runs along the watershed of the Pennines, and descends by the Eden valley to Carlisle, the importance of that junction being further enhanced by the cross-country line from Newcastle through the Tyne valley, and the three main lines from Scotland.

FIG. 80.—*The Tyne Ports.*

The Northumberland and Durham Coal-field.—The counties of Northumberland and Durham are separated by the river Tyne, which runs across the middle of the coal basin to the sea. *Newcastle* takes its name from a castle erected immediately after the Norman conquest close to the site of the ancient Roman bridge which gave origin to the town. The shipping of coal from Newcastle (called "sea-coal" in the old days) has gone on from the thirteenth century, and it is still the greatest coal-

shipping port for coasting trade. The Tyne for ten miles, from Newcastle to the sea, has been deepened to admit large vessels, and the harbours of *North* and *South Shields* at its mouth are included with the docks which line the river as the *Tyne Ports* for custom-house purposes. *Gateshead*, on the south side of the river, shares the industries of Newcastle, which are chiefly the manufacture of iron, machinery, and chemicals. The great Elswick Works, where the largest warships are built, rank with the works at Essen in Germany and Le Creusot in France. One characteristic of the manufacturing region surrounding Newcastle, as of that in South Wales, is the absence of factories employing women. This gives rise to quite different social conditions from those prevailing on the other coal-fields where factory work predominates. *Sunderland*, at the mouth of the Wear, almost rivals the Clyde in shipbuilding, and like the *Hartlepools*, just north of the Tees, it has a considerable coal export. The picturesque cathedral city of *Durham* contains a university, the science college of which is in Newcastle.

The West Riding Coal-field.—The ancient woollen industries of the Pennine villages have developed by the aid of mechanical power and perfected communications until the valleys of the Aire and Don, with their tributaries, are now amongst the most densely peopled of manufacturing districts, although the uplands between them are still desolate moors. Half a dozen railway lines connect this coal-field across the central ridge with the Lancashire coal-field on the west, and communication with the south and east is still more complete. Most of the raw wool is now imported through Liverpool, and the export of finished goods takes place both through that port and through Hull. *Leeds*, the largest town of the district, stands near the point where Airedale opens on the Vale of York, and while it has become one of the chief cloth manufacturing towns and the leading cloth market in Europe, it does not rely on one staple. Iron, smelted in the town, supplies great engineering works at which heavy machinery of all kinds is turned out. *Bradford*, about eight miles further west, specialises in the manufacture of worsted yarn and cloths woven from it. *Halifax* and *Huddersfield*, on the extreme west of the coal-field, and many other large towns in the neighbourhood, each manufactures some special class of woollen goods. *Sheffield* depends not on woollen but on steel manufactures. It is beautifully situated in a picturesque amphi-theatre of hills at the junction of several streams with the Don. It has been famous for its cutlery for many centuries, and has always imported Swedish iron for use in this manufacture, which is said to have been promoted by the existence of good grindstone quarries in the neighbour-hood. All branches of steel manufacture are now concentrated here, including steel rails, armour plates for battleships, and machinery.

Outside Yorkshire, *Nottingham*, where the south-east of the coal-field practically touches the Trent, is a great textile manufacturing town, the staple of its trade being cotton hosiery and lace. *Derby*, in a similar

position where the south-western corner of the coal-field nearly touches the Derwent, a tributary of the Trent, has somewhat similar manufactures, and has in addition the works of the Midland Railway Company whose main line traverses the coal-field.

The East Yorkshire Plain and the Humber.—The escarpment of Magnesian Limestone which marks the eastern boundary of the Coal Measures is separated by a narrow arm of the Central Plain from the Oolitic escarpment. This plain, underlain by Triassic or New Red sandstones, stretches northward through Nottinghamshire from the point where the Trent begins to turn northward, to the estuary of the Tees. In some parts of it coal can be reached by deep mines, but the surface being covered by rich soil its value is mainly agricultural. The richness of the land and quiet beauty of the country, varied by the remains of Sherwood and other ancient forests, have led to the building of many fine country mansions, and one part bears the familiar name of the "Dukeries," on account of the number of ducal seats. It is, as a whole, a low and level plain, dipping gently from both sides to the Humber, the Trent running northward along its eastern margin, and the Ouse with its tributaries running southward. The Vale of York, famous for its farms and for its horse breeding, is covered with alluvial and glacial deposits. In the middle *York* is situated, the ancient walls still encircling the town, and its magnificent Minster being claimed as the finest church in the British Islands. The central position, midway between London and Edinburgh, which made it, as *Eboracum*, the capital of Roman Britain, now secures it importance as a railway junction. *Hull*, although situated in the Chalk Belt, owes its importance entirely to being the deep-water harbour on the North Sea nearest to the coal-fields of the West Riding and Lancashire, with which it is in close railway connection. It is the natural complement of Liverpool, serving for the export of manufactures to the Baltic and Continental ports. Its old trade in fish still continues although surpassed by other interests.

The Lancashire Coal-field.—The Lancashire manufacturing region, including the portions lying in the neighbouring county of Cheshire, has a population as large as that of Scotland, and there is probably no other part of the world of equal extent so densely peopled. The coal-field only yields enough for local consumption in the innumerable factories and engineering and chemical works, and there is no export of coal. Although the towns are marked on ordinary maps as separate and distinct, this only refers to the different municipalities. The area covered by buildings is almost continuous for a radius of eight miles round the centre of Manchester on the low western plain, and large towns are clustered close outside, while strings of industrial villages run up the narrow dales of the Pennine Chain to the east between the moorland pastures. The woollen industry was originally as common in this district as on the Yorkshire side; but the imported cotton has long since taken the first place, the moist climate favouring its manufacture. The twin centres are Liverpool

and Birkenhead, the gate for exports and imports, and Manchester and Salford the depôts for distributing the raw material to surrounding manufacturing towns, and collecting the finished goods. The opening of the Manchester Ship Canal which allows ocean steamers to come direct to the inland centre has not yet materially affected this relation. *Liverpool* runs for six miles along the right or eastern bank of the Mersey estuary, and for this distance there is a continuous row of docks, outside which a floating landing-stage allows the largest steamers to come alongside for embarking and landing passengers. The tides of the estuary are very rapid, but a serious bar which used to prevent large vessels entering at low water has been completely cut through by dredging, and the port is always accessible. As well as a great exchange and other business edifices, Liverpool possesses fine public buildings and museums, and one of the colleges of the Victoria University. *Birkenhead* on the left bank of the estuary is approached by ferry steamers and by a tunnel under the Mersey. Apart from its docks it is a residential suburb of Liverpool. Although there are extensive engineering works, some shipbuilding, and a large number of manufactures of every kind, the real importance of Liverpool lies in its harbour and the associated railway system. The lower course of the Mersey between Manchester and Liverpool is over a low, flat and marshy plain, which was originally almost impassable on account of bogs, and the construction of the first railway between the two towns (30 miles) across the Chat Moss in 1829, was considered one of the greatest engineering feats of the time. This bog and many others have since been drained and converted into solid ground. *Manchester* forms practically one town with *Salford*, though separated from it by the narrow stream of the Irwell, which like most rivers of the district is as black as ink from dye refuse. The centre consists mainly of vast warehouses, for Manchester itself is mercantile rather than manufacturing; the Royal Exchange is said to be the largest building of its kind in existence, and the Town Hall is also a superb structure. Owen's College is the chief college of Victoria University. The factories are in the suburbs and in the ring of neighbouring towns. Ashton, Oldham, Rochdale, Bury, and Bolton (or Bolton-le-Moors) lie close up to

FIG. 81.—*Liverpool and Birkenhead.*

the steep rise of the Pennine moorlands along the third part of a circle from east to north-west of Manchester, and all are within ten miles of its centre. *Oldham* is by far the most important for manufactures; in fact it contains one-third of all the cotton spindles in England. *Bolton* specialises in the finest qualities of cotton yarn, and *Bury* and *Rochdale* retain a considerable woollen manufacture, although cotton-spinning predominates. Close to the northern edge of the coal-field *Preston* stands at the head of sea navigation on the Ribble, where the main line of the London and North-Western Railway crosses the river. Here Arkwright set up the first spinning frames worked by mechanical power in 1768, and the cotton

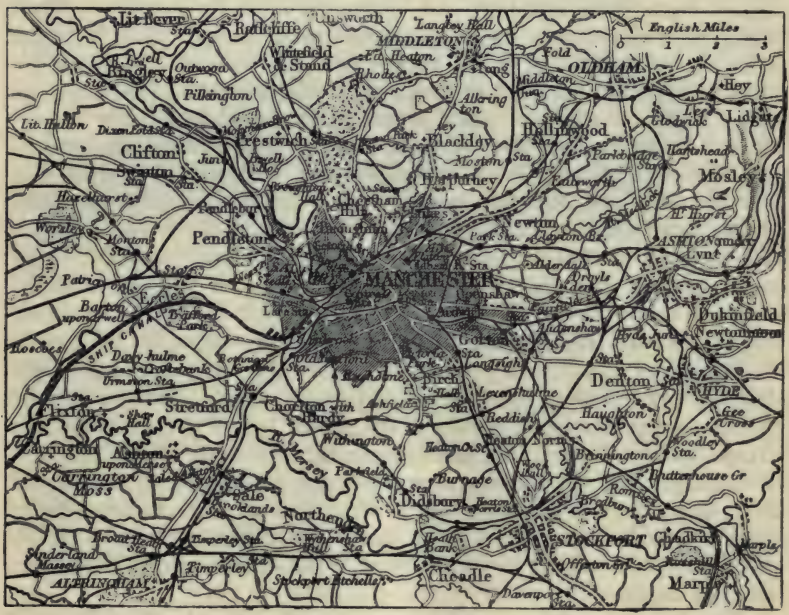

FIG. 82.—*The Manchester District.*

industry is still of great importance. At *Blackburn*, in a valley nine miles to the east, Hargreaves had established his "spinning jenny" in 1767, and it is still one of the chief seats of cotton-weaving. The canal from Liverpool to Leeds and a railway pass eastward through Blackburn and up the valley which leads across the Pennine ridge to Airedale, through *Accrington* and *Burnley*. All these towns depend on cotton. The number of factories on this coal-field creates an enormous demand for machinery, and the towns consequently contain large engineering works. There are extensive chemical, glass and soap works at *St. Helens*, and other towns surrounding Liverpool. The great industrial population of the region

requires the creation of a number of health and pleasure resorts on the breezy uplands of the Pennine Chain, and along the fine sand-beaches of the coast where *Southport* and *Blackpool* are the largest of a host of watering places.

The Central Plain.—The Central Plain of England may be looked on as extending from the Mersey and Dee estuaries, and the southern slope of the Pennine Chain on the north to the Welsh hills on the west, and the line of the Oolitic escarpment on the south and east. It corresponds to the region of the Triassic red rocks and of the Lias; only where the strata have been raised into gentle north and south folds in the west, patches of the Coal Measures have been exposed by denudation. Here the surface is comparatively high and undulated, but it forms one low plain traversed by the Weaver on the north-west, and another followed by the Avon to the south-west, while on the east the rivers flowing from the Pennine dales and the short streams from the Oolitic escarpment converge on the Trent, the course of which is guided northward by the low escarpment of one of the hard beds of the Lias. This plain comprises the greater part of the counties of Cheshire, Staffordshire, Worcester, Warwickshire, Leicestershire, and Nottingham. It is very rich agriculturally, and was formerly covered by extensive woods; the names of the Forest of Arden and Charnwood Forest being still applied to large districts. Now pasturage is of the greatest importance, the cattle of the west and the horses and sheep of the east being famous. It is full of scenes of historical interest; castles round which hang romantic traditions of all ages of English history, battlefields where the destinies of the nation have been decided, and crossing points of natural routes which were guarded by Roman camps in ancient days, and are served by railway junctions like Crewe, Stafford, Rugby, and Leicester, in our own time. It is the centre of England, and the scenery around *Stratford-on-Avon*, which inspired Shakespeare, may be taken as typical of all that is most characteristic of rural England. Across this plain there is a network of canals which practically places all the navigable rivers of the country in communication with one another.

The Cheshire Plain and Potteries.—The Cheshire Plain is one of the richest grazing districts, and celebrated especially for its cheese. *Chester* is remarkable for the perfection with which its Roman wall surrounding the town has been preserved, and for the quaint mediæval streets with arcaded pavements. It was a seaport in Roman times, but the head of the estuary of the Dee has now been silted up and it is cut off from the sea. The Trias rocks contain great beds of rock salt which are worked in the Weaver valley, especially at *Northwich*; but it is cheaper to get the salt by pumping brine from the mines, water being allowed to enter in order to dissolve it. As a result of this method of working, subsidences of the ground are continually taking place, and sunk, cracked, or twisted houses are common in the towns. Where the Coal Measures rise to the surface

in North Staffordshire, there is a dense population in the upper valley of the Trent grouped in numerous small towns around *Burslem* and *Hanley*. The district is known collectively as "The Potteries," on account of the great industry in earthenware and china promoted by the quality of the clay found in the neighbourhood.

The Black Country.—From very early times the great forest of Arden had supplied charcoal for smelting iron ore, and various iron and steel industries had developed in Birmingham, Wolverhampton, and many other small towns in the neighbourhood. Family workshops were the rule, and even the women and children were brought up to blacksmith's

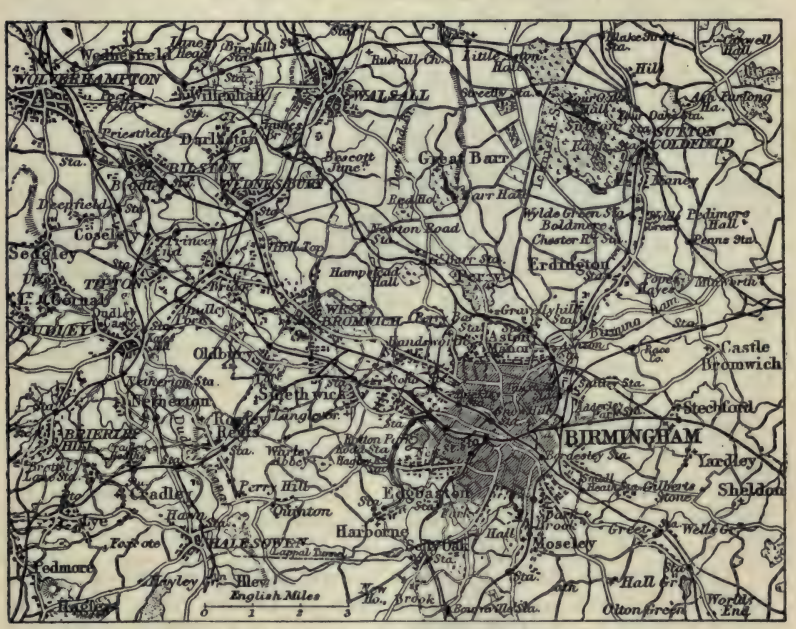

FIG. 83.—*Birmingham and the Black Country.*

work, making nails chains, and other small articles. When the discovery was made that coal could be used in working iron, and the iron trade deserted the southern counties, it remained unchanged in the Black Country on account of the coal-fields of South Staffordshire. *Birmingham* has grown into a great city and a very important railway centre, but, although the modern methods of large establishments have been introduced, many small family workshops still remain turning out articles of a special kind. Jewellery of all sorts, watches, coins for foreign governments, buttons, beads, and small metal work of every description, are its characteristic trades. The making of firearms is also very important, from

flint-locks for African trade to magazine rifles. Bedsteads employ many hands; bicycle-making and the construction of steam-engines are largely carried on. Birmingham is a progressive and enterprising town; its municipality has taken a lead in introducing modern improvements, from steam-engines and gas-lighting in the early days of the great firm of Boulton and Watt, to electric traction at the present time. The public buildings are very fine, the pictures in the Corporation Galleries are exceptionally good, and the new University with its modern Faculty of Commerce educates one of the most alert and intelligent populations in the country. The smaller towns of the Black Country are as cheerless as the name of the district implies. Trade is much specialised. *Wolverhampton* has numerous blast furnaces, and manufactures all kinds of heavy iron goods; other towns produce needles or nails, spurs or horses' bits, fish-hooks, light chains, chain-cables for shipping, and even steel anchors. The condition of the women and children engaged in nail and chain-making in their cottages was formerly deplorable, and in some quarters is still a reproach.

Other Towns of the Plain.—*Burton-on-Trent* is the greatest brewing town in the country, the water of the district being specially suitable for brewing on account of containing sulphate of lime. The supply of barley for malting and of hops demands good railway facilities, and the streets of Burton are much cut up by railway sidings running to the breweries. Large cooperages have also been established to turn out the innumerable casks required. *Coventry*, a very ancient town, has acquired modern importance on account of its great manufacture of cycles. *Leicester*, in the flat valley of the Soar, a southern tributary of the Trent, was one of the old woollen manufacturing towns, the pastures of the neighbourhood yielding a fine wool particularly adapted for woollen hosiery, which is still the staple manufacture. Boot and shoe making is also important. A curious outcrop of Archæan and other ancient rocks occurs to the north-west of Leicester, giving rise to the picturesque hills of Charnwood Forest, in some of which granite is quarried.

The Jurassic Belt.—From the eastern end of the Cornwall-Devon peninsula, and skirting the Central Plain of Triassic rocks, a series of bands of Secondary and Tertiary rocks sweeps in a northern curve, each formation dipping below the next, and forming by the weathered edges of the harder strata facing the north or west more or less continuous escarpments or lines of heights. The contrast of the gentle dip-slopes and steep escarpments is explained by Fig. 30. The determining influence which the edges of the gently-tilted strata exercise on the course of the drainage of the country is best exemplified by the Exe-Tees line of watershed by which the South-Eastern district is bounded. The Avon-Severn flows south-westward, and the Soar-Trent north-eastward, parallel and close to the first escarpments of the Secondary rocks, so that no tributaries exceeding a few miles in length reach them from the south or east. Even beyond the break of the Humber estuary to the north, the course of the Yorkshire

Ouse is parallel to the escarpments. A similar parallelism may be traced in many other rivers, the courses of which appear inexplicable on any map not showing geological features. The escarpments are formed usually of some one hard bed of sandstone or limestone, the softer beds of clay or marl weathering away to level or undulating plains. The bold front of the Oolitic escarpment can be traced in a sweeping curve from Portland Island on the south, overlooking the remarkable line of Chesil Beach, through the Cotswold Hills, where the highest point is 1,100 feet, and the low ridges towards the north-east, until it reaches the North Sea in the high mass of the North Yorkshire Moors south of the Tees, where elevations of nearly 1,500 feet occur. The land slopes gently from the Oolitic escarpment in broad plains of clay to the edge of the Chalk or Cretaceous escarpment. Though narrow on the south coast, the Jurassic Belt widens towards the north, including the greater part of the counties of Gloucester, Oxford, Buckingham, Bedford, Northampton, Huntingdon, Rutland, Lincoln, and the North Riding of Yorkshire. Besides building stone, quarried largely at *Portland*, where a great prison supplies convict labour, in the neighbourhood of Bath, where the Box tunnel pierces the escarpment, and elsewhere, the chief mineral products of this formation are clays for brickmaking, fossil deposits used as fertilising agents, and the abundant iron ore of the Cleveland Hills, which form the escarpment of the Yorkshire moors. The ore brought down from these hills to the Tees is smelted at *Middlesbrough* by coal brought from the Durham field. The steep coast formed by the moors is cut into narrow river-mouths, in one of which the little town of *Whitby* has grown up, and the fashionable watering-place of *Scarborough* also stands upon this coast. The steep slopes of the Cotswolds near the other end of the line shelter a row of towns on the Lias plain below them, of which *Gloucester* and *Cheltenham* are the chief. The deep valleys which trench the southern end of the escarpment contain small towns which have been engaged in the manufacture of "West of England cloth" for centuries. This was orginally a consequence of the fine-woolled sheep pastured on the hills; but it has not undergone a modern development, as in the Pennine district, and *Bradford-on-Avon*, *Frome*, and *Stroud* are still of only local importance. *Bath*, although containing some flourishing manufactures, owes its importance to the hot mineral springs which made it famous amongst the Romans as a health resort. The middle portion of the Jurassic Belt is lower than the pastoral Cotswolds and the Yorkshire Moors, with less pronounced escarpments, and the broad fields of Oxford and Kimmeridge Clay make excellent agricultural land, growing heavy crops of wheat. The river Thames, rising on the Cotswold plateau, flows eastward until it meets the Cherwell coming from the north. At the junction *Oxford* stands on an alluvial meadow. It is the most venerable seat of learning in England, with a university dating from the twelfth century, and now composed of twenty-one colleges, most of them picturesque buildings with beautifully kept

gardens. Museums, laboratories, and observatories supply means of scientific instruction, but Oxford continues to be famous rather for classical learning than for scientific research. *Bedford* is a type of the market towns, with small manufactures of agricultural implements, which are common in the district. *Northampton*, on the river Nen, was always a great leather-making town, and is now the chief seat of the boot and shoe trade in the United Kingdom. The Nen flows north-eastwards, parallel to the strike of the strata, and *Peterborough*, a cathedral city and an important railway centre, stands on it at the very edge of the Fenland. Further north *Lincoln* occupies a remarkable site in a gap where the Witham trenches one of the minor escarpments. The name implies that it was a Roman colony, and it was always a crossing place of roads as it is now of railways. In the whole Jurassic Belt there is not one town with a population approaching 100,000 inhabitants; this is a consequence of the absence of mineral fuel to promote manufactures.

The Chalk Country.—The Chalk is the characteristic feature of the south and east of England, covering the whole of the older rocks over almost the entire area. It sweeps as a vast sheet from the sea at the mouth of the Axe in the south, to the sea at Flamborough Head in the north; and its edge, facing the older Cretaceous rocks (Greensands) that dip under it as the Jurassic rocks dip under them, forms the succession of gentle heights roughly concentric with the Oolitic escarpment, which in different parts bears the names of the Dorset Downs, the Marlborough Downs, the Chiltern Hills, the East Anglian Heights, the Lincolnshire Wolds, and the Yorkshire Wolds in the East Riding, terminating in the great chalk cliffs of Flamborough Head. This escarpment also shows a certain controlling influence on drainage lines, but the rivers flowing parallel to it on the plain on the north in almost every case turn abruptly and flow southward through gaps in the ridge. The soluble rock of which it is composed has been rapidly eroded and cut through by the streams flowing down the dip slopes, which in time "captured" and diverted the rivers of the plain beyond. Everywhere the scenery of the Chalk uplands is the same, rolling country with dry valleys and grassy, treeless hills, the white chalk gleaming through every scratch on the overlying turf. On the east coast this formation, and the Jurassic Belt within it, is breached by two notable inlets. The southern is the wide and very shallow depression known as the Wash, which is bordered landward by the level plain of the Fenland. The northern inlet is the narrower and deeper estuary of the Humber. A portion of Dorsetshire, the greater part of Wiltshire, a considerable share of Hampshire and Oxfordshire, most of Hertfordshire and Cambridgeshire, the west of Norfolk and Suffolk, the east of Lincoln and the East Riding of Yorkshire all lie on the Chalk. The southern portion is mainly pastoral, the thin soil covering the Chalk serving only for the growth of pasture grass, but farther north the ancient ice-sheet spread a covering of boulder clay which makes a fertile soil peculiarly favourable to wheat-raising in Cambridge and Lincoln.

Towns of the Chalk Country.—As in the Jurassic Belt, the towns, though numerous and of much historic interest, are small; they have as a rule taken little part in modern development, and the rural market town is the predominant type. Salisbury Plain is the centre whence the Chalk hills of the northern and the southern branches diverge. Its undulating pasture-grounds bear the great stone-circle of Stonehenge, the largest prehistoric monument in the British Islands, and on the southern margin of the slope, at the junction of several river valleys with the south-flowing Avon, stands *Salisbury* with its magnificent cathedral. The valleys of the other south-flowing rivers of the Chalk plateau contain towns of equal antiquity and historic interest situated in very similar positions; of these *Winchester*, associated with the memory of Alfred the Great, is the most important. On the northern edge of the Chalk, where the Kennet flows eastward to the Thames below Marlborough Downs, *Marlborough* is situated. The Vale of Aylesbury, north of the Chilterns, is dotted with a chain of small market towns. On the west and south the Thames closely borders these hills, and *Reading* stands at the confluence of the Kennet, on the margin of the fertile London clay, a busy town with the semi-agricultural industries of biscuit-making and seed-raising. *Cambridge*, on the edge of the Chalk where the low plain of the Fenland begins (it is only 32 feet above sea-level), is the second great university town of England, with seventeen colleges. It has for many centuries been the chief centre of mathematical learning. In the east of Lincolnshire the largest town is *Grimsby*, at the mouth of the Humber. It has a large general trade, and is distinguished by being the chief market for sea fish in the United Kingdom, London excepted. North of the Humber the Chalk wolds of the East Riding are separated from the Oolitic moors of the North Riding by the valley of the Derwent. In this region the boulder-clay deposit is very thick, the whole Holderness coast from the high chalk cliff of Flamborough Head to the low shingle spit of Spurn Head being formed of clay, which is being rapidly eroded by the sea.

The Fenland.—An extensive but shallow depression of the Chalk and Oxford Clay gave rise to a great square inlet of the sea between Lincoln and Norfolk, fringed by broad marshes. This district is the Fenland. Efforts have been made for centuries to reclaim and drain the marshes; their primitive character is now qui e lost, and they form wide flat plains of arable land crossed by innumerable canals, and in many places embanked to protect them from floods, as some portions lie at, or even a little below, the level of the sea. *Boston*, with its great parish church, the famous tower of which (Boston stump) was long an important landmark to sailors, and *Kings Lynn* stand on the seaward margin at opposite angles of the shallow Wash. Both were formerly active seaports, but the silting of the channels and the increasing size of vessels have left them out of account. Here and there over the Fens flat mounds of gravelly formation rise above the level peat and clay. These were islands and secure refuges in the ancient days.

Each now bears a little town, of which the cathedral city of *Ely* is the most important. The Fenland contains a remarkable number of fine churches and abbeys.

The Weald.—Above the Chalk, and leaving only a narrow strip of it exposed parallel to the belt of Jurassic rocks, a series of Tertiary clays, sands, and gravels, appears once to have extended across the whole south-eastern corner of England. This was the last portion of the British Islands to be elevated above the sea. During the final uplift the whole south of England appears to have been subjected to stresses from south to north, causing the ridging up of a broad anticline running from east to west. Salisbury Plain forms the western extremity of this elevation of the Secondary strata ; and the Tertiary rocks were almost entirely stripped by denudation from the ridge which separates the remaining Tertiary formations into two basins, named after London and Hampshire. The ridge has been so deeply eroded that all the chalk has been stripped from the top of the arch east of a line from Farnham to Petersfield, exposing the Gault clay, Greensand, and Weald clay, on which it lay, and the still deeper Lower Cretaceous sandstones, which formed the core of the ridge. The cut edges of the Chalk and of the Greensand form steep escarpments surrounding and facing the great oval exposure of earlier rocks, across the east end of which the Strait of Dover has been cut, leaving part of the Wealden region on the mainland of Europe in the north-west of France. The northern line of the Chalk escarpment of the Weald, with its steep slope facing south, forms the North Downs, beginning in the Hog's Back, and terminating in the white cliffs of the North and South Forelands. The rivers flowing northwards from the ancient Wealden dome, cut through the line of the North Downs in a series of deep gaps, most of which are now the sites of towns, and afford passage to roads and railways. From west to east these rivers are the Wey, on which *Guildford* stands (Fig. 16), the Mole with *Dorking*, the Dart with *Sevenoaks*, the Medway with *Maidstone*, and the Stour with *Ashford* and the venerable cathedral city *Canterbury*. All these rivers receive tributaries which flow parallel to the strike of the rocks along the clay plains between the escarpments. The escarpment of the South Downs similarly faces northward, and runs along the south coast to terminate in the grand cliffs of Beachy Head. The rivers flowing southward from the Wealden dome have cut it into lengths by several gaps, some no longer occupied by streams, including that at the mouth of which *Chichester* lies, and those of the Arun with *Arundel*, the Adur, the Ouse with *Lewes* and *Newhaven*, and the Cuckmere. Their tributaries similarly run from east or west along the clay plains between the escarpments (see Fig. 36 for explanation). The Chalk Downs, dry on

FIG. 84.—*Section across the Weald from North to South.* cc *Chalk*, gg *Greensand escarpments*, w *Wealden sandstones.*

the surface but saturated with water at the heart, are in sharp contrast to the flat wet strips of clay land at their base, to the Greensand escarpments within them, and to the arid heights of the Wealden sandstones in the centre, in which the small number of streams and springs makes the water supply a question of much anxiety. A great part of the sea-coast of the Weald is a low coastal plain, which tidal action and the slow elevation of the land has recently built, robbing the old seaports *Rye*, *Winchelsea*, and *Pevensey* of their access to the water, and building the shingly projection of Dungeness, enclosing the swamps of Romney Marsh, which was formerly a lagoon, like that behind Chesil Beach. The ancient forests of the Weald formerly made Surrey, Kent, and Sussex important iron-smelting counties, but their furnaces have all been extinguished for a century, and most of the woods have disappeared. The chief resources now are pasturage on the downs, yielding the famous South Down mutton, and agriculture on the clays and sandstones of the Weald, especially the great hop-crops of Kent, for the picking of which the poorest class of Londoners swarms to the fields every autumn. *Dover* flourishes because it commands the shortest passage to the continent by the Calais route, but deep borings in the neighbourhood have reached coal beneath the Cretaceous rocks, and mines may become important. *Brighton* is simply a fashionable seaside suburb of London, fifty miles distant from the metropolis, but reached in one hour by rail, and *Eastbourne*, *Hastings*, and *St. Leonards* are similar resorts on a smaller scale. To the north *Margate* and *Ramsgate*, on the Isle of Thanet, no longer an island, are popular with the humbler London "trippers," and *Tunbridge Wells* in the centre of the Weald, like *Haslemere* farther west, is a favourite town for residence.

The Hampshire Basin.—The Tertiary rocks form a fertile undulating plain. In the south-west the New Forest is still an extensive woodland, the remains of that planted as a hunting-ground by William the Conqueror. The coast is usually low, and is broken by the branching estuaries of Poole and Portsmouth, and the wider channels of Spithead and the Solent, which cut off the Isle of Wight and run up into Southampton Water. All parts of the coast formed by Tertiary deposits are undergoing rapid erosion, and the sea is gaining upon the land. The Chalk border on the south is seen at Ballard Point, is carried across the centre of the Isle of Wight and appears again beyond Bognor. *Portsmouth* is the most strongly fortified town in the United Kingdom, on account of the importance of its splendid harbour as the head-quarters of the navy, and the site of the chief naval dockyard. *Southampton*, a purely commercial port with good docks, is increasing in importance for passenger traffic with South Africa and America on account of its proximity to London. Health and pleasure resorts line the coast, the most frequented being *Bournemouth*, laid out on the top of the crumbling clay cliffs to the west, and the little seaside towns of the Isle of Wight.

The London Basin.—The London Basin, made up of various clays and gravels, occupies a depression in the Chalk, which is reached everywhere by the borings for artesian wells. It extends from the eastern border of Wiltshire, along the valley of the Kennet, and gradually widens until it meets the sea from Herne Bay to Cromer. The coast of this section is typically low and fretted into shallow estuaries, among which that of the Thames is supreme, although the Blackwater and the inlets at Harwich are equally characteristic. In the east of Norfolk the low, flat land on the lower courses of the Yare, Bure, and Waveney, contains a number of shallow lagoons known as the Broads, surrounded by marshes. Foulness, the Naze, and Orfordness are typical capes of low ground. The gravel hills are often conspicuous features in the generally flat land formed by the clays, as in the line of heights which runs from Harrow eastward through the northern suburbs of London. The soil is remarkably fertile and naturally richly wooded, Epping Forest being a fine example. The manner in which the London Basin is surrounded by its wall of Chalk cannot fail to strike the railway traveller from London by any line except the Great Eastern, on account of the deep chalk cuttings which are passed through. The one great river is the Thames, which cutting through the Chalk escarpment west of the Chiltern Hills, flows out along the south side of the London Basin, receiving the Lea from the Chalk belt on the north, and many small rivers from the Weald on the south.

The Small Towns of the London Basin.—The towns of the Thames valley are, with the exception of London and its suburbs, small and mainly important as centres for residential neighbourhoods. *Windsor* is the usual royal residence of the British court, and the small town of *Eton* on the opposite bank of the Thames, is important for its ancient public school. In the north-east, where the deposits of the London Basin are covered by the thick boulder clays of East Anglia, there was, before the fall in the value of wheat, the best farming land in England, and the counties of Essex, Suffolk, and Norfolk are still pre-eminent agriculturally. The large town of *Norwich* is just beyond the London Basin. It was an ancient cloth-making town, and one of the first to profit by the immigration of Flemish weavers; it still retains a share of this manufacture, although boot and shoe making, the construction of agricultural machinery, and great starch and mustard works are now more important commercially. On the coast *Yarmouth* continues to be a fishing centre; *Ipswich* retains a share of manufactures; *Colchester* depends largely on the great oyster beds of the Colne estuary, and *Harwich* has developed by the construction of an artificial harbour for continental passenger traffic, the distance across the North Sea being just sufficient to give the passengers by night-boats time to sleep comfortably. Along the shingly coast there are many little watering-places, celebrated for the freshness of the air.

London.—The name *London* is variously applied. The *City of London*,

the portion under the jurisdiction of the Lord Mayor, is a small area between the Tower and the site of Temple Bar, with a resident population of only about 30,000, although ten times that number are employed within its limits during the day. The *County of London,* administered by the London County Council, has an area of 120 square miles, or one-thousandth part of the United Kingdom, and a population, in 1901, of 4½ millions, or more than one-tenth of the population of the country. But the area under the charge of the Metropolitan and City Police forces, called *Greater London,* includes a radius of about 14 miles from Charing Cross—an area of 690 square miles—the whole of which may be viewed as a suburban, if not an urban district, and this included 6½ million people in 1901. The *Port of London* comprises the whole estuary of the Thames, extending for 50 miles from London Bridge to the Nore (see Fig. 85). No such town exists in any other part of the world. The population exceeds that of Scotland or Ireland, and is even greater than that of fifteen of the independent countries of Europe, while the trade of the port is greater than that of any complete country except the United States, Germany, and France. The nature of its growth and the successive swallowing up of innumerable towns and villages deprives it of any definite plan, but although of little architectural distinction, and with many narrow and irregular streets, the essential feature of a complete drainage system has been so carefully attended to, that London has the smallest death-rate of any large town, and is scarcely below the average of the whole country in healthfulness. The natural features of the site of central London have been obscured by nearly twenty centuries of human interference ; but the results of the original topography are still to be discerned in the arrangement and in the names of the streets. Before Roman times there was a fortified British camp called *Linn-dun* (the hill over the lagoons)—on a low hill which rose abruptly from the Thames, constricting the tidal lagoons which then formed its estuary to a width that admitted of a ferry, and latterly of a bridge (London Bridge) being established. This hill was strengthened for defence by the steep ravine of the Fleet river (now Farringdon Street) on the west, and the Lea marshes on the east. The Romans had one of the ferries or fords to connect their trunk roads at this point, the other crossing being at Westminster, two miles farther up the river. From Westminster ford, Watling Street (the present Edgware Road) ran straight to Chester, but when the first London Bridge was built in 1170 the ford was abandoned, and the road diverted at what is now Marble Arch, to lead eastward to the bridge. The Tower of London is the lineal successor of the old hill fort, and St. Paul's Cathedral marks the centre of ancient London and of the modern

FIG. 85.—*Thames Estuary.*

"City" (Fig. 15). Between them now stands the Royal Exchange and the Bank of England—the business and financial centres of the world. Westminster was originally grouped round the ancient abbey, which is now the last resting-place of the most illustrious of the British people. Here Westminster Hall was part of the palace of the early kings, and still stands in association with the Houses of Parliament that have been several times rebuilt on the same site. The road between the commercial city of London and the political capital of Westminster lay along the low strand of the broad tidal Thames, hence its name; but now it is separated from the river by the broad Embankment which confines the tidal waters to a narrow channel. The port was necessarily below London Bridge, and up to that point the river was kept available for shipping by embanking it, and

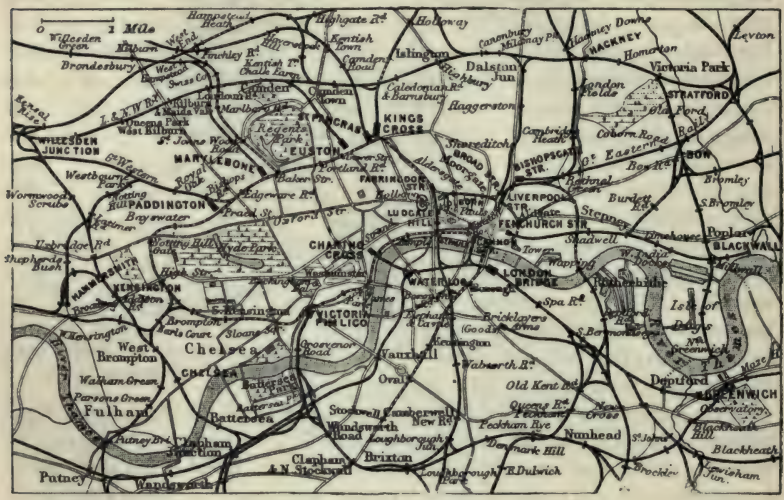

FIG. 86.—*London.*

excavating docks in the flat ground projecting between the windings. As vessels became larger the docks were increased in size also, and constructed further down the estuary, until now the activity of the Port of London extends to Tilbury, 20 miles from the Tower. The east of London has grown by commerce and has attracted many branches of manufacture, the enumeration of which would be impossible. In no other country is there so vast an extent of small streets inhabited exclusively by people of the working classes, drawn from all nationalities, as in the East End of London, a term including the separate municipality of *West Ham*. On a hill on the south side of the river stands Greenwich Observatory, which sets the time for the world and whose meridian is the zero of longitude. Farther down *Woolwich* contains an arsenal and dockyard. For more than two hundred

years London has been growing steadily westward from the City, the tide of business always pushing the mansions of the wealthy farther and farther to the west. Recently the heights to the north and to the south of the Thames beyond the ring of public parks have been covered by suburban villas, inhabited by the business men of the city, and the expanding fringe of London is always driving the country farther away. The terminal stations of the great railway companies are not arranged on any method allowing of easy inter-communication; but for passenger traffic the system of underground railways has been greatly developed. In the main thoroughfares the traffic is too great to allow tramlines to be laid, and alone amongst great cities London depends for street communications on omnibuses.

FIG. 87.—*Railways radiating from London.*

London as a Centre.—Although London is situated in one corner of Great Britain, the exigencies of its absorbing traffic have created a magnificent system of fast express trains on the northern and western railways, which bring almost all parts of the country within a twelve hours' journey of the capital. The supplies for the food of London and for distribution to the surrounding country come in by train and by sea. The chief markets for fish at Billingsgate, for vegetables, flowers, and fruit at Covent Garden, and for meat at Smithfield are of vast size, but inadequate to the demand. The trade of the port of London is mainly in imports, which amount in value to one-third of those of the whole country, and the tea and wine trades are almost monopolies of the port. The University of London, reorganised in 1901, has still its reputation to make, but it includes famous colleges, and the great medical schools of the large hospitals. The British Museum, with a library of 2,000,000 volumes, contains unrivalled collections of objects of antiquity and natural history, and there are many special museums and art galleries. The

scientific societies of London are the headquarters of all branches of British science. The publishing trade has been centralised in London to a remarkable degree, almost all the publishers who made Edinburgh famous as a literary centre early in the nineteenth century have removed to London, although much of the printing is done in other towns.

The Isle of Man.—The Isle of Man, lying in the Irish Sea, is independent of either England, Scotland, or Ireland, a fact hinted at in its coat of arms. The island enjoys complete home rule; the legislative body, called the House of Keys, is composed of twenty-four landed proprietors. A governor is appointed by the British government to represent the Crown. The island is of great geological interest, being composed, like the Lake District, mainly of Silurian rocks, patches of Carboniferous limestone, and some bosses of granite. The northern portion is a drift-covered plain, but the centre and south of the island are high, the highest point, Snaefell, slightly exceeding 2,000 feet. There are some important lead mines, and the mild climate is favourable to stock-raising. The little towns of *Ramsay*, *Douglas*, and *Castletown* on the east coast, and *Peel* on the west, attract a great number of summer visitors.

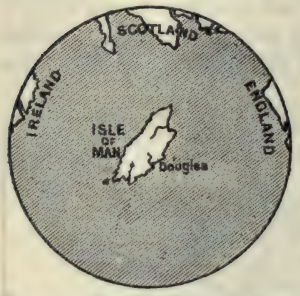

FIG. 88.—*The Isle of Man. The circle has a radius of 45 miles.*

FIG. 89.—*The "Arms" of the Isle of Man.*

The Manx people are of Keltic origin, and their original language is not forgotten, being still taught in the schools in addition to English. The Church of England is established under the Bishop of Sodor and Man, a title which recalls a former grouping of the Isle of Man with the Hebrides.

The Channel Islands.—The group of islands including Jersey, Guernsey and Alderney, lying off the coast of Normandy, with which they were probably connected by land in prehistoric times, were part of the domains of William the Conqueror, and although the people are still of Norman race and French speech the islands have never formed part of France politically. The dialect of each island is peculiar to itself, but all are derived from the *langue d'oil*, and modern French is used officially, but the use of English is rapidly spreading. Ecclesiastically they form part of the See of Winchester, and for some purposes they are attached to the county of Hampshire; but the islands are self-governing, and retain many curious privileges and quaint customs. There is compulsory military service for all men in the militia. The islands enjoy a mild climate, and each possesses a special breed of cattle

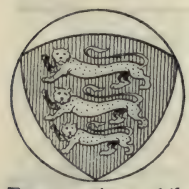

FIG. 90.—*Arms of the Channel Islands.*

valuable for dairy purposes. The fertility of the soil is great and the leading occupation is farming, or rather market gardening, for the farms which belong to the peasantry are now very small on account of the practice of dividing the land amongst all the sons of a family. Early vegetables for the London market, and fruit, grown for the most part under glass, are the chief exports. The detached rocks about the larger islands and the rapid currents of the sea make navigation difficult and dangerous, but steamers run regularly to the French ports from 15 to 30 miles away, and to Weymouth and Southampton, 90 and 150 miles distant. Jersey, the largest island, has its chief town at *St. Helier*, and Guernsey, which is not much smaller, has a harbour at *St. Pierre*. In addition to its farm produce Guernsey exports granite, particularly for paving.

FIG. 91.—*Area of English-speaking in Jersey* ("*Globus*," 1894).

IV.—IRELAND

BY GRENVILLE A. J. COLE,
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Position and Outline.—The name *Ireland* or *Eire-land*, according to tradition, comes from that of *Eire* (earlier *Eriu*), one of the queens of the Tuatha Dé Danann. Ireland stands on the edge of the European plateau, the sea-floor sinking to oceanic depths on the west; while on the east it is divided from Great Britain by shallow seas, rarely deeper than 70 fathoms. The western coast-line is deeply indented, and obviously reproduces the features of the sea-lochs of Scotland and the fjords of Norway. The long inlets are river-valleys that have been lowered beneath the sea, and the walls that bounded them now jut out as headlands into the Atlantic, their outermost peaks forming characteristic chains of islands. The attack of the ocean-rollers has, in places, formed cliffs of considerable height; at Slieve Liag in Co. Donegal, and at Achill Island, there are almost sheer descents of 2,000 feet. The east coast of Ireland includes few fjords, though the names of Wexford, Carlingford, and Strangford show how the typical structure even there impressed the Danish settlers. In general, however, on the east there is a series of broad bays and accumulated sands, broken only here and there by some bold feature like Bray Head.

Surface and Structure.—The general form of the surface of Ireland resembles a shallow basin, the highlands being grouped along the coast. The watershed between an eastern and a western group of rivers may be traced from Lough Foyle to Mizen Head, but is a sinuous line marked by no special surface-features. In some cases rivers of both groups arise on opposite sides of the same central bog-land.

The Northern and Eastern Mountains.—The high plateaux of

the north-east are due to the outpouring of basaltic lavas, tier upon tier, in Eocene times. Immense denudation has since gone on, and Lough Neagh has been formed by the fracture and subsidence of part of the volcanic area. The Mourne Mountains are formed of Eocene granite. The highlands of western Londonderry, Donegal, Mayo, and Galway are formed of far more ancient rocks. A series of folds running north-east and south-west determined the general structure of this region at the close of Silurian times. Here and there, portions of the still older floor of metamorphic rocks, on which the early Palæozoic strata were laid down, have been brought to light. The age, however, of many of the altered series is still uncertain. Errigal (2,466 feet), Croagh Patrick (2,510 feet), and the Twelve Bens (2,300 feet), are good examples of the conical mountains formed by the occurrence of hard bands of quartzite, at various horizons, in this antique region. The same system of north-east and south-west folds is traceable across Ireland wherever the older rocks appear through the Carboniferous coating. Silurian and Ordovician beds thus form a long ridge from near Dundalk through Co. Down, and the Newry granite comes up along this axis. In Leinster, again, a granite moorland, seventy miles long, forms a backbone to the province, flanked similarly by upturned Older Palæozoic strata.

FIG. 92.—*The Axes of Folding of Ireland.*

The Southern Mountains.—The mountains on the south and south-west, on the other hand, have been determined by post-Carboniferous folding, and the axes here run east and west. The upward folds, or anticlines, have weathered out as ridges, owing to the hardness of the Old Red Sandstone conglomerates, which have here been brought to the surface. The downward folds, or synclines, contain the softer Carboniferous limestone, which has been greatly worn down, forming a system of east and west valleys. Long stretches of the Suir, the Blackwater, the Lee, and the Bride thus follow the axes of folding. The abrupt bend southward in the lower part of the Blackwater and other rivers may be due to the interruption of their original courses by glacial material. The waters that once flowed on along the east and west synclinals thus overflowed into the channels of southward-running rivers, deepening them until they were continuous in each case with the main river-bed. When subsidence of the west coast occurred, the main valleys were already formed in the synclines, and the sea entered them between the anticlinal ridges of Old Red Sandstone, forming the inlets of Dingle, Kenmare, Bantry, and Dunmanus. Farther north, the same system of folding is manifest in the Galtee Mountains (3,000 feet), and in the axis of

Slieve Felim and Slieve Bloom. In the latter region, however, the trend of the ridges was diverted by the older series of folds (see black lines on Fig. 92).

The Central Lowland.—Central Ireland is, in general, a lowland, with many brown bogs, stretches of green meadow, and numerous lakes, sinuous in outline, and enclosing abundant islands. The Carboniferous limestone here covers an immense extent of country, and repeats, on the broadest scale, the features seen in the compressed synclinals of the south. The synclinal from the Leinster chain to the Slieve Bloom axis is 35 miles wide; and thence a second still shallower one stretches to the foot of the Donegal and Mayo highlands. Clew Bay, with its host of islands, is merely a marine representative of the inland lakes. The broad area of Carboniferous limestone retained in the central plain gives a uniform character to the interior; and from Galway to Dublin, 115 miles, there is not a hill of any importance. Near Sligo, however, and in the west of Clare, the same strata have been uplifted to form scarped and terraced mountains. The lower ground has served for the accumulation of sands and gravels from the surrounding hills, the final distribution of which has been largely influenced by the confluent glaciers of the Ice Age. The Shannon and its important tributary, the Suck, run north and south through the plain. The former, if we include the Owenmore river, rises on the moors of Cuilcagh, falls steeply at first, and then has a gentle course of over 200 miles. It thus appears mainly as a broad lowland stream, spreading out to form Loughs Allen, Boderg, Forbes, Ree, and Derg. At Killaloe it cuts for a time through mountainous country, and forms a series of rapids at Castleconnell on its way to Limerick.

Minerals.—The Coal Measures, lying above the Carboniferous limestone, have been preserved only in a few isolated basins. The coal, moreover, is of an anthracitic character, except near Lough Allen and Dungannon. This fact has caused the manufacturing centres to lie almost entirely on the east coast, where coal from Scotland or England can be obtained by cheap sea-carriage. The Dungannon Coal Measures are partly overlain by New Red Sandstone, and are thus capable of further development. Active iron-mining in Ireland is confined to the pisolitic ores of Co. Antrim, which are interbedded, as old lake-deposits, in the Eocene basalts. Bauxite is worked, for aluminium, in the same district. Rock-salt is mined near Carrickfergus, and barytes in Co. Cork. Copper and lead are now very little worked, even in Co. Wicklow. The abundant discoveries of prehistoric gold ornaments in Ireland go far to show that alluvial gold was at one time common in the country; but the supply was probably soon exhausted. The quartz-rocks of Cos. Donegal and Wicklow have been indicated as the source; and small nuggets have been found in the latter county in historic times, while the quartzites contain recognisable quantities of gold upon assay. Grains of gold are still obtained by washing the sands of some streams near Arklow.

The compact grey limestones of the central counties, and the fine-grained sandstones of Donegal are used for city-buildings. The black marbles of Galway and Kilkenny, the red from Co. Cork, and the unique green serpentinous marble of Connemara, are used for decoration. Grey granite is quarried at Newry, and red granites occur in Co. Galway and elsewhere. Hard flags occur in Co. Clare. The cost of carriage and of working retards the Irish stone industry. The one material excavated with unfailing regularity is peat—locally called turf—which is extensively used for fuel.

Fauna and Flora.—The exceptional features of the fauna and flora of Ireland have been previously referred to (p. 142).

People and History.—Separated from South Wales by some 50 miles, and from Scotland at one point by only 13 miles, and with the broad Atlantic on the west, it is clear that the natural incorporation of Ireland in the British Isles has profoundly influenced her history. Her insular position laid her open to attack from a variety of nations, at a time when journeys by sea were simpler than those by land. The early settlers in Ireland appear to have come in some small degree from southern Europe, but mainly from the Keltic tribes of Gaul and Britain ; but these invaders found men of the Stone Age already in occupation. Though the characteristic civilisation and language of the country thus had a Keltic origin, anthropological research shows that the people are non-Keltic and of still earlier type. The distinctive characters of the peasantry are not confined to those who still speak the Irish language. Courtesy, quickness of idea, a delicate or humorous aptness of expression, a conservatism of method, and a deep sense of the supernatural in ordinary life, are features of the agricultural community, and imply less mixture of race than might have been expected from the frequent immigrations. The dominant tribe became ultimately known as the Scots, who occupied the plain, holding the country from the centre, much as the Magyars now hold Hungary. These Scots and their subject tribes invaded Wales and Cornwall. A colony in Galloway spread northward, and gave its name to Scotland. The Romans never established themselves in Ireland ; but in the middle of the fifth century St. Patrick successfully introduced Christianity, and the country still abounds in Christian monuments erected by his monastic successors. The round towers are now believed to belong mostly to the ninth century. Ecclesiastical learning and art flourished, and Irish missionaries spread into central Europe. The seizure of the harbours by Danes and Norwegians from 800 A.D. onwards checked external enterprise ; but the development of the towns of Dublin, Wexford, Waterford, and Limerick, as commercial centres, dates from this invasion. Dublin became the centre of Norse power in Ireland, while rival Irish kings strove for inland supremacy. Brian, however, drove the Danes from Limerick in 968, and broke their power at Clontarf in 1014. They held Dublin, Wexford, and Waterford till the Norman inva-

sion under Richard de Clare in 1170. The Anglo-Norman governors soon regarded themselves as local Irish chieftains, and their insular position often overcame their loyalty, despite the existence of an official Viceroy in Dublin. This defection of many of the settlers reduced the English district to a small area round Dublin. Henry VIII. came to be styled king of Ireland, and drew to his side those who had long looked for a central authority. But no English predominance was established until after the wars of extermination carried on by Elizabeth's generals. The virtual forfeiture of Ulster by the government of James I. led to the introduction of sturdy English settlers on an organised basis, and the name of Londonderry records the source of many of the colonists. The emphasis laid upon religious differences resulted in a bitter rising in 1641, the ultimate suppression of which was left to Cromwell. The loyal party under William III. secured the passing of "penal laws," whereby land and other property were gradually brought into the hands of the Protestants. The export of wool was forbidden, and, outside the district of the linen industry, the people were driven to rely on agriculture alone. The conciliatory measures of the Dublin parliament came too late to check the sanguinary rebellion of 1798. Parliamentary union with Great Britain took place in 1801, and in 1829 Roman Catholics were first allowed to sit in parliament. To this day the country presents suggestive traces of its comparatively recent colonisation in the sixteenth and seventeenth centuries. In 1901 the Roman Catholics numbered 74 per cent. of the entire population.

Present Economic Condition.—The growth of population was rapid between 1800 and 1845, and the general reliance on the potato as a source of food led to the disastrous famine of 1846, when the potato crop failed. The western peasantry, isolated in small bodies among the mountains, naturally suffered most, even when relief had been freely supplied from England. A steady decline in population has since gone on. The sea has provided a simple means of exodus to America, just as in old times it served as a means of approach. At the present time the country appears to be increasing in prosperity, and much is being done, by legislation and private effort, to maintain the population on the soil. In former days water-power was largely used for mills, and the formation of reservoirs may again utilise the rainfall. From poverty in coal, the country must always depend largely on systematic agriculture and grazing. Of late years crops have been neglected, while large numbers of cattle have been exported. In the north, flax is cultivated, as a basis for the flourishing linen-industry. Shipbuilding prospers in Belfast. Distilling and brewing are important in the large towns. Cloth and lace are manufactured locally. The sea-fisheries have largely developed. Butter and bacon form the main exports of the south and south-west. The Congested Districts Board, the construction of "light railways," and the new department of Agriculture and Technical Instruction have done much to stimulate industry. Many lines

of steamers connect the eastern ports with England and Scotland ; and American liners call at Queenstown, and at Moville on Lough Foyle.

Divisions and Towns.—The division of Ireland into provinces, under an over-lord, dates from prehistoric times, though the boundaries have slightly varied. The provinces are divided into counties, and these into baronies, which mostly bear ancient and interesting Gaelic names.

Leinster includes the twelve counties of Louth, Longford, Westmeath, Meath, Dublin, King's Co., Queen's Co., Kildare, Wicklow, Kilkenny, Carlow and Wexford. The north consists largely of a Carboniferous limestone plateau, used for grazing. The Boyne rises in the bogs near Edenderry, and runs through a wooded valley below Navan. *Drogheda* occupies its mouth, on a good inlet for shipping. The Liffey rises in the Wicklow Mountains, makes a loop of 75 miles through the plain, and enters the sea at Dublin Bay. A wooden bridge was erected across it here

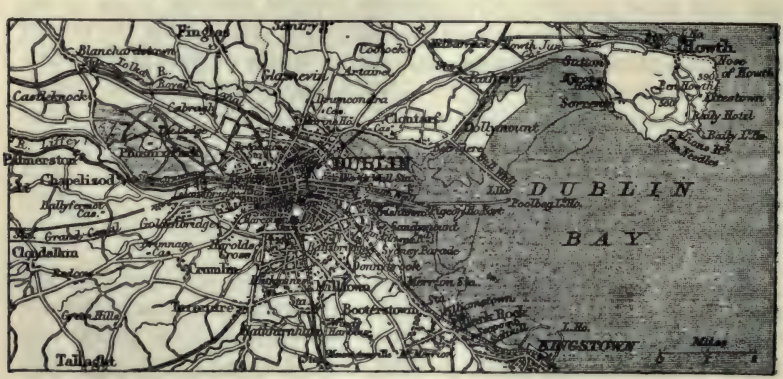

FIG. 93.—*Dublin.*

in ancient times, and Dubh-linn, the Black Pool, became the site of a town guarding the passage. The bay, sheltered between the hills of Howth and Dalkey, was accessible both to Norsemen and English ; and *Dublin* became the capital of the invaders. It is the seat of the Viceregal court, and of the Dublin University, founded in 1591 ; also of the Royal University. There are several important libraries and museums. The quays on the Liffey serve for a good import and export trade ; the mails cross to Holyhead from *Kingstown*, a fine harbour six miles down the bay. The city has of late extended greatly on the south. The old quarter round the Castle and Cathedrals is poor and dilapidated ; but the expansion in the eighteenth century provided Dublin with many handsome public buildings, classical in style. Dublin is mainly an administrative and professional city, but has large breweries, mineral water factories, chemical works, and other manufactures. South of Dublin, Leinster broadly divides itself into the mountain axis on the east, and the western Carboniferous

synclinal, including the pastoral lowlands of Kildare and the high Kilkenny coal-field. Beyond the Slieve Bloom range, the King's County stretches to the Shannon. The Nore and the Barrow run north and south on either side of the coal-field, uniting at *New Ross* in a navigable channel. The Leinster granite chain rises to 3,039 feet in Lugnaquillia, and forms a long moorland, commonly 2,000 feet above the sea. The flatter ground east of the chain widens towards the south, where *Wexford* town has a fair shipping and agricultural trade.

Ulster includes the nine counties of Donegal, Londonderry, Antrim, Tyrone, Fermanagh, Cavan, Monaghan, Armagh, and Down. The planters of the seventeenth century introduced a virile and enterprising element. Immigration from Scotland took place at various times ; and a great part of the population remains Presbyterian. Antrim contains high basalt plateaux, the columnar jointing of the lavas being admirably seen in the Giant's Causeway near Portrush. *Belfast* (*Beal feirste*, the "ford of the sandbank") was occupied by the Normans, and was finally secured for England in 1573. The steady growth of trade in the port, and of the linen and shipbuilding industries, have raised the population from 30,000 in 1810 to some 350,000 at the present day. The modern city has handsome well-kept streets, with conspicuous commercial buildings. The Queen's College is on the south, and there are seven public parks. The shortest route to Britain is from Larne, some 20 miles to the north. The basalt plateaux fall towards Lough Neagh, the largest lake in the British Isles. The Bann runs through it, continuing as a broad stream to the sea at *Coleraine*, 100 miles from its source in the Mourne Mountains. *Londonderry*, still walled, rises picturesquely on the west bank of the Foyle, and has large agricultural exports. From the Sperrin Mountains across Donegal there stretches a romantic highland, mainly occupied by Irish-speaking people. The south-west of Ulster is less rugged, and the scenery of the two Loughs Erne graduates into that of the plain. An agricultural country of green rounded hills extends from this point eastward. The Mourne Mountains occupy the south-east of Co. Down, Slieve Donard (2,796 feet) and Slieve Bingian (2,449 feet) being conspicuous summits.

Connaught includes the five counties of Mayo, Sligo, Leitrim, Galway, and Roscommon. It lies almost entirely west of the Shannon, and its comparatively poor lands were often occupied by persons ejected from the east. In the mountains of Galway and southern Mayo lies some of the most beautiful scenery of Ireland ; but the whole area eastward belongs to the limestone plain. Loughs Conn, Mask, and Corrib are thus broad sheets of water, with low eastern and mountainous western shores. The population of the Connaught highlands is thickest along the coast, and is engaged in fishing. The towns of *Galway* and of *Sligo* are thus fishery-centres. The former stands at the outfall of Lough Corrib, and is a natural port for the trade of Galway Bay, which runs 30 miles west to the open ocean.

Munster includes the six counties of Clare, Limerick, Tipperary, Kerry,

and Cork. The indentations of the coastline render it highly picturesque. The warm south-westerly winds preserve a richness of vegetation, except on the limestone terraces of Clare. Co. Tipperary consists partly of the plain, partly of the Old Red Sandstone ranges. The acropolis of *Cashel* is one of the most remarkable groups of antique buildings in Europe. *Limerick*, despite its trade in bacon and agricultural produce, has felt the effects of decreased population. It has a beautiful situation on the Shannon, above which the Norman stronghold rises. The east and west mountain-ranges occupy most of Cos. Cork and Kerry, culminating in Carrantuohill (3,414 feet), a peak in Macgillicuddy's Reeks. The lower lake of Killarney belongs to the plain, while the upper is enfolded in wooded mountains. The population of Kerry preserves many ancient characteristics, and dwells mostly on the coast. The island of Valentia is a starting-point for one of the most important transatlantic cables. In the east, Munster becomes richer and more cultivated; the Suir and the Blackwater often run between high banks of woodland. *Cork*, the third largest city in Ireland, is well built upon the Lee, and its suburbs run down towards *Queenstown*, a station for the American mails. The winding but spacious harbour is set with wooded islands. The chief trade lies in agricultural exports. *Waterford*, founded by the Danes, occupies a similarly sheltered position on the inlet of the Suir, and has a corresponding trade with England. The east and west ranges that form the south of Ireland are here broken by St. George's Channel, and we pass somewhat abruptly to the foot-hills of the Leinster chain.

STATISTICS OF THE UNITED KINGDOM.

	1881.	1891.	1901.
Area of the United Kingdom in square miles..	120,979	120,979	120,979
Population „ „	35,241,482	38,104,975	41,605,323
Density of population per square mile	291	314	344

DISTRIBUTION OF POPULATION.

	England.	Wales.	Scotland.	Ireland.	Isle of Man.	Channel Islands.	Abroad.[1]
1881 ..	24,613,926	1,360,513	3,735,573	5,174,836	53,558	87,702	215,374
1891 ..	27,483,490	1,519,035	4,025,647	4,704,750	55,608	92,234	224,211
1901 ..	30,805,466	1,720,609	4,472,103	4,456,546	54,758	95,841	—
Area, sq. miles	50,867	7,442	29,785	32,583	227	75	—

THE MOST POPULOUS COUNTIES[2] IN 1901.

Name.	Area, sq. miles.	Population.	Name.	Area, sq. miles.	Population.
London	118	4,536,063	Essex	1,533	816,503
York	5,939	1,891,726	Middlesex	233	792,225
Lancaster	1,757	1,827,391	Chester	1,009	601,070
Lanark	882	1,339,289	Devon	2,597	437,210
Kent	1,519	936,003	Cork	2,890	404,813
Stafford	1,142	879,618	Edinburgh	362	488,647
Durham	999	833,614	Antrim..	1,237	461,240

THE LEAST POPULOUS COUNTIES[2] IN 1901.

Name.	Area, sq. miles.	Population.	Name.	Area, sq. miles.	Population.
Nairn	195	6,291	Bute	218	18,786
Kinross	73	6,980	Rutland	152	19,708
Peebles	355	15,066	Radnor	471	23,263

[1] Takes account only of soldiers and sailors. [2] County boroughs not included.

THE LARGE TOWNS OF THE UNITED KINGDOM.[1]

Name.	1881.	1891.	1901.	Name.	1881.	1891.	1901.
LONDON (County)	3,816,483	4,232,118	4,536,063	PLYMOUTH ..	73,795	87,480	105,404
GLASGOW ..	674,095	793,320	735,906	Hanley	75,912	86,945	100,290
LIVERPOOL ..	552,508	584,499	684,947	SOUTH SHIELDS..	56,875	78,391	97,267
MANCHESTER ..	341,414	505,368	543,960	Dudley	87,527	90,252	96,988
Birmingham ..	400,774	478,113	522,182	Huddersfield ..	81,841	96,495	96,383
Leeds	309,119	367,506	428,953	Burnley	63,638	86,034	95,816
Sheffield	284,508	324,243	380,717	SWANSEA	73,971	90,349	94,514
DUBLIN	349,648	352,277	379,861	Stoke-upon-Trent	64,091	75,352	89,023
BELFAST	208,122	255,950	348,876	Ystrad-y-fodwg ..	—	88,351	88,968
BRISTOL	206,874	286,231	321,908	Halifax	73,630	89,832	88,909
Edinburgh ..	236,002	261,225	316,479	Walsall	59,402	71,789	86,440
West Ham ..	128,953	204,902	267,308	HARTLEPOOL ..	46,990	64,882	86,310
HULL	165,690	200,044	239,876	St. Helens ..	57,403	71,288	80,722
Nottingham ..	186,575	213,877	239,753	Paisley	55,638	66,418	79,355
Bradford	183,032	216,361	228,667	Stockport.. ..	59,553	70,263	78,871
SALFORD	176,235	198,136	220,956	CHATHAM ..	46,788	59,210	78,746
NEWCASTLE ..	145,359	186,300	214,803	GRIMSBY	45,351	58,661	78,198
Leicester	122,376	174,624	211,574	DEVONPORT ..	63,980	70,204	78,059
Oldham	111,343	183,871	194,197	LEITH	59,485	67,700	76,667
Wolverhampton	164,332	174,365	192,750	Rochdale	68,866	71,401	76,122
PORTSMOUTH ..	127,989	159,251	189,122	Northampton ..	57,544	70,872	76,073
CARDIFF	82,761	128,915	164,420	CORK	80,124	75,345	75,978
DUNDEE	140,239	153,051	160,871	*York*	61,166	67,004	75,391
SUNDERLAND ..	116,542	142,248	159,359	Dewsbury ..	69,566	72,896	74,349
Brighton	107,546	142,129	153,393	Wednesbury ..	68,142	69,083	72,478
ABERDEEN ..	105,189	121,623	143,922	Stockton-on-Tees	55,460	68,875	71,812
Croydon	78,953	102,697	133,885	GREENOCK ..	65,884	63,096	67,645
Bolton	105,414	118,730	130,602	NEWPORT (Mon.)	38,427	54,707	67,569
Blackburn ..	104,014	120,064	127,527	IPSWICH	50,546	57,360	66,622
Merthyr Tydfil ..	91,373	104,021	122,536	*Reading*	46,054	60,054	65,468
SOUTHAMPTON ..	84,384	93,589	120,302	West Bromwich..	56,295	59,474	65,172
PRESTON	96,537	111,685	118,220	Warrington ..	45,253	55,349	64,702
MIDDLESBROUGH	72,661	98,932	116,539	Coventry	46,563	54,755	63,817
Norwich	87,842	100,970	111,728	*Hastings*	47,619	60,878	62,913
BIRKENHEAD ..	84,006	99,857	110,926	Wigan	48,194	55,013	60,770
GATESHEAD ..	65,803	85,692	109,887	Bury	53,240	57,212	58,028
Derby	81,168	94,146	105,785	*Bath*	53,875	54,551	52,751

AGRICULTURE OF THE UNITED KINGDOM.

	Wheat.	Barley.	Oats.	Turnips.	Potatoes.
Acres in 1874	3,819,011	2,500,217	4,076,570	2,466,823	1,412,851
„ „ 1886	2,355,457	2,423,060	4,403,579	2,302,219	1,353,808
„ „ 1895	1,454,173	2,337,929	4,512,306	2,229,183	1,251,703
„ „ 1900	1,898,863	2,164,438	4,131,138	1,986,465	1,215,440

MINERAL PRODUCTION OF THE UNITED KINGDOM.

	Coal.		Iron Ore.		Pig Iron manufactured.
	Amount, tons.	Value, £.	Amount, tons.	Value, £.	Tons.[2]
1878 ..	132,654,887	46,429,210	15,726,370	5,609,507	6,300,000
1888 ..	169,935,219	42,971,276	14,590,713	3,501,317	7,898,000
1896 ..	195,361,260	57,190,147	13,700,746	3,150,424	8,659,681
1900 ..	225,181,300	121,652,596	14,028,208	4,224,400	8,959,691

TOTAL IMPORTS OF RAW COTTON INTO UNITED KINGDOM.

(In million pounds weight.)

Year	1820. ..	1840. ..	1860. ..	1880. ..	1901.
Amount	152 ..	592 ..	1,391 ..	1,629 ..	1,830

ANNUAL TRADE OF THE UNITED KINGDOM.

	1871–75.	1881–85.	1891–95.
Imports	£360,204,000	£399,584,000	£417,791,000
Exports[3]	239,502,000	232,272,000	226,969,000
Re-exports[4]	58,184,000	63,038,000	60,533,000

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[1] SEAPORTS in small capitals, *other towns* not near coal-fields in italics.
[2] From native and imported ores.
[3] Of British produce.
[4] Of foreign produce previously imported.

THE BRITISH EMPIRE IN 1901.[1]

(*Approximate.*)

	Area, sq. miles.	Population.	Shipping: tonnage entered and cleared.
United Kingdom	121,000	41,500,000	98,500,000
Indian Empire	1,640,000	294,000,000	8,600,000
Colonies :—			
Gibraltar	2	27,000	8,700,000
Malta and Gozo	120	183,000	7,000,000
Aden and Perim	80	41,000	4,900,000
Ceylon	25,400	3,600,000	7,400,000
Straits Settlements	1,500	580,000	13,300,000
Hongkong	400	384,000	14,000,000
Basutoland	10,300	250,000	—
Cape Colony	277,000	2,350,000	9,500 000
Natal	29,200	930,000	2,800,000
Orange River Colony	48,300	207,500	—
Transvaal Colony	119,100	1,094,000	—
Gambia	70	13,500	260,000
Gold Coast	40,000	1,500,000	1,400,000
Lagos	3,500	42,000	1,070,000
Sierra Leone	4,000	75,000	1,290,000
Mauritius	880	394,000	670,000
Seychelles	150	20,300	320,000
Ascension and St. Helena	80	10,000	300,000
Dominion of Canada	3,049,000	5,370,000	14,170,000
Newfoundland and Labrador	162,000	210,000	1,450,000
Bermuda	20	17,500	730,000
British Honduras	7,500	37,000	340,000
Bahamas	5,400	53,700	1,110,000
Jamaica and Turk's Island	4,400	758,000	2,030,000
Leeward Islands	700	128,000	1,650,000
Windward Islands	500	160,000	2,570,000
Barbados	170	195,000	1,360,000
Trinidad and Tobago	1,800	272,000	1,200,000
British Guiana	120,000	288,000	700,000
Falkland Islands	7,500	2,000	160,000
Fiji	7,700	120,000	190,000
British New Guinea	90,500	350,000	40,000
New Zealand	104,000	772,000	1,680,000
Queensland	670,000	497,000	1,650,000
New South Wales	310,000	1,353,000	8,100,000
Victoria	88,000	1,200,000	5,870,000
Tasmania	26,000	166,000	1,230,000
South Australia	903,000	363,000	3,690,000
Western Australia	976,000	182,000	3,200,000
Total, United Kingdom, India, and Colonies	**8,856,000**	**359,875,000**	**233,920,000**
Protectorates, &c. :—			
Asia	120,000	1,200,000	—
Africa	2,160,000	35,000,000	—
Pacific Islands	800	30,000	—
Total, British Empire	**11,137,000**	**396,100,000**	—

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[1] Generalised from *The Statesman's Year Book* for 1902.

CHAPTER XIII.—THE SCANDINAVIAN KINGDOMS

I.—THE SCANDINAVIAN PENINSULA

By Yngvar Nielsen,[1]

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Position and Extent.—The two kingdoms of Sweden and Norway occupy the whole Scandinavian Peninsula from Knivskjelodden (71° N.) near the North Cape to Smyge Huk (55½° N.), in Scania; and from the island of Būland (4½° E.) to the meridian of Vardö (31° E.). The breadth of the peninsula varies from 230 to 470 miles, and the length is 1,160 miles. The long west coast faces the Atlantic and the North Sea, and the harbours along its whole extent remain unfrozen all the year round. At Lindesnes the coast bends to the east along the Skagerrak, which then runs northward into Christiania Fjord, while the Kattegat runs southward along the west coast of Sweden. The Öresund, or Sound, separates Scania, the extreme south of the peninsula from the Danish Islands. The Baltic turns north-eastwards along the east coast to the Åland Islands, and is continued northward by the Gulf of Bothnia, north of which the Scandinavian Peninsula is attached to the mainland of Finland and Russia by an isthmus three hundred miles across. On the east coast of the peninsula, especially in the Gulf of Bothnia, the harbours may be blocked by ice for as much as six months of the year. With the exception of Russia, no other countries in Europe stretch over so great an extent in latitude. While the south of Sweden lies in the same latitude as the Cheviot Hills, Stockholm lies parallel with the Orkney, and Bergen with the Shetland Islands; and in the north the peninsula passes far beyond the Arctic Circle.

Norway and Sweden share the geographical unity of the peninsula which can be described as a whole; but the historical development of the two countries has been very different, and for internal politics they are entirely independent of one another; hence in these aspects they must be separately described. The names Norway and Sweden may be conveniently used in the physical description as generally corresponding to the western and eastern slopes of the peninsula.

Geology.—The Scandinavian peninsula is built up for the most part of very ancient rocks. In Norway the Archæan rocks are widely spread in the south-east, and often penetrated by masses of granite and gabbro,

[1] Translated from the German by the Editor.

while Silurian formations are spread over a large area round Christiania Fjord and the lakes in its neighbourhood. Archæan rocks come to the surface also over all southern and western Norway, but in the interior of the country they are overlaid by sparagmite, and different schists and limestones, quartzite also appearing on the high mountains. In the Jotun mountains all these strata are broken through by masses of gabbro. Throughout the Trondhjem district schists are greatly developed, while further north the Archæan rocks reappear, pierced by intrusions of granite. The Lofoten Islands, like the neighbourhood of the Lyngen Fjord, are masses of gabbro. Ancient sandstones are widely distributed in Finmarken. Archæan formations also predominate in Sweden, where they are in part overlaid by Cambrian and Silurian strata, especially round the great lakes; only in Scania, in the extreme south, do Triassic, Jurassic, and Cretaceous rocks appear. The large island of Gottland belongs entirely to the Upper Silurian formation. Where the ancient rocks do not themselves appear on the surface in the peninsula, glacial formations, clay, gravel, and sand cover extensive areas. Fertile patches covered by good soil are also found, especially in Sweden, where the principal agricultural districts are in Scania and East and West Gothland. In Norway fertile land occurs only on the margins of Christiania Fjord, the lakes of Tyrifjord, Randsfjord, and Mjösen, and of Trondhjem Fjord. The soil is favourable for the growth of forests in most places; between 50 and 60 per cent. of the area of Sweden is wooded, but in Norway only about 20 per cent. on account of the greater elevation of the country.

Configuration.—The Scandinavian Peninsula on the whole forms a plateau. In the east and south the elevation is small, but towards the west the land rises gradually, and reaches its maximum height in a great ridge near the west coast. This ridge from north to south forms the main watershed of the peninsula, and the boundary between the two countries runs along it for a great part of its length. Thus it comes about that only a small portion of Sweden is mountainous, while Norway is, next to Spain, the most conspicuously mountainous country in Europe. In the west the narrow fjords penetrate steep-walled, rocky gorges for ninety miles or more from the sea, while on the east long and sometimes wide valleys provide more gradual access to the high mountain regions. In the Jotunheim, where the peninsula reaches its greatest height, Glittertind attains 8,380 feet, and Galdhöpiggen 8,400 feet, and further west Store Skagestölstind, 7,861 feet. In the far north the mountains rising directly from the sea reach a considerable height, some exceeding 6,000 feet. The greatest heights in the north-west of Sweden are Kebnekaise (7,004 feet) and Sarjektjokko (6,988 feet). Southern Sweden contains a hilly district, cut off from the mountains of the north by the depression of the large lakes.

Numerous snowfields and glaciers are formed in the great mountains, especially in the north and towards the west coast. In the south of Norway the Folgefonn, Jostedalsbræ, Aalfotebræ, and Hardangerjökel are

the most important, and in the north Svartisen, Heldalsisen, and Frostisen. The largest expanse of snow is the Jostedalsbræ, which reaches a height of 6,800 feet, and is surrounded by other great snowfields; twenty-four glaciers of the first rank flow from it. The large glaciers of the eastern slope are confined to the far north.

On account of the character of the soil and of the great average elevation the quantity of absolutely useless land is very great. In Norway only 3,500 square miles of land are available for agriculture or pasturage, but in Sweden more than 19,000 can be utilised.

Coast.—The coast is extraordinarily broken and indented; not only are there numerous fjords and bays, but in most places innumerable off-lying islands forming the *Skjaergaard* ("Skerry wall") protect the coast, and give it a distinctive character. In Norway large islands lying far from the mainland take the place of the Skjaergaard in the north; the largest of these groups are those of the Lofoten and Vesteraalen. Between many of the islands tremendous currents are formed by the tide, amongst them the famous Malström between Værö and Moskenesö, the appearance and effects of which were greatly exaggerated by old writers. The large and interesting islands of Gottland and Oland lie off the coast of Sweden in the Baltic. The total area of all the islands connected with Sweden is about 3,000 square miles, and of those connected with Norway about 8,600.

FIG. 94.—*Portion of the Coast of Norway 70 miles by 40, showing over 400 islands.*

The formation of the coast with the off-lying islands affords innumerable sheltered harbours for fishermen; and many banks frequented by great shoals of cod occur in the broad Vestfjord, east of the Lofoten Islands.

Lakes and Rivers.—While the average proportion of Europe occupied by lakes and rivers is only 0·5 per cent. of the area, the percentage of the area of lakes and rivers in Norway is 4, and in Sweden it is as much as 8. The rivers are frequently broken by picturesque waterfalls. The rivers on the eastern side of the main watershed are of course the longest. Several long rivers from the southern Norwegian mountains converge on Christiania Fjord, the Glommen which flows south through the Österdal, and its tributary from the Gudbrandsdal being the chief. Many long rivers with numerous lakes in their course cross Sweden from west to east throughout its whole length. The Klarelf, the greatest Scandinavian river, runs southward to Lake Vener. The depression of the great lakes lies to the north of the plateau of southern Sweden, from which short streams are received by Lake Vetter, and discharged eastward by the large Motala river to the Baltic. The lakes of this depression are four in number—

Lake Vener (2,100 square miles in area, the third greatest lake of Europe) lies on the west, and drains to the Kattegat through the Götaelf, the continuation of the Klarelf, then Lake Vetter (730 square miles), and north-east of it Lakes Hjelmar and Mälar draining to the Baltic. On account of their low elevation and their central position these lakes have been largely utilised as means of communication by the construction of canals which unite the lakes to each other and to two seas. They have thus been of the utmost service in the material development of Sweden.

Climate.—Compared with other northern countries, the climate of Scandinavia is very favourable. On account of its great range of latitude there is necessarily a marked difference between the south and the north, and on account of exposure to prevailing winds the west has a much milder climate than the east; the annual isotherm of 45° F. is found on the west coast at Ullensvang in 60° N., and towards the east coast at Lund in 56° N. lat. The greatest cold in winter is experienced in the interior of northern Sweden and in Finmarken. The majority of the population of Norway, living upon the coast, enjoys much milder conditions than the people of Sweden, whose country is more exposed to continental influences; but the high valleys of Norway have a very severe and unfavourable climate. The rainfall is greatest on the Norwegian coast, where in winter rain and fog are very common, and there is comparatively little snow, though violent storms often occur. At Dombesten the annual rainfall is 79 inches, and in Florö in 61½° N. it is 74; but the general rainfall along the Norwegian coast is estimated at from 32 to 35 inches. At Christiania the rainfall is only 28 inches, and on the high plateau of the Dovrefjeld it is under 14. The greatest rainfall in Sweden is on the west coast, facing the Kattegat, where 35 inches are recorded; but the east coast is very much drier, the fall at Kalmar being only 13 inches: thus the contrast between the mild and moist sea climate of western Norway and the dry continental climate of eastern Sweden is complete. The curves in Fig. 95 contrast the temperature and rainfall of the west coast of Norway with those of the most extreme continental climate in the world. In winter most of Scandinavia is covered with snow, and the peasants then employ *ski* or long snow-shoes, in the use of which they are very expert.

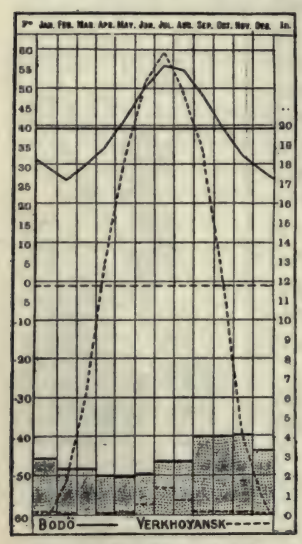

FIG. 95.—*Monthly Rainfall and Temperature for Bodö (Norway) and Verkhoyansk (Siberia).*

People and History.—The great body of the population of the peninsula belong to the Scandinavian family of the Teutonic race. In

very early times the Lapps entered from the north along the central range of mountains. At a remote period a great immigration of Finns took place in the north of the peninsula, and another immigration of these people in 1600 was directed to the central parts of the country. The Scandinavians have long been divided into Norwegians living in Norway and Swedes in Sweden; originally of the same stock, they have become more and more distinct. In the Middle Ages the Swedes were composed of two originally independent peoples, the *Svear* in the north, and *Götar* in the south. The bright sonorous Swedish language is derived through a long history from the earliest common linguistic stock of Scandinavia, whilst Norway, during its union with Denmark, adopted Danish and lost its old language, the Norröna, from which the dialects still spoken are derived.

Norway has formed a separate kingdom since 872; and in the ninth century also the Swedish lands were united under a single king. From that time the two nations have gone their several ways, as indeed they had done in the earlier viking period when the Norwegians carried their conquests towards the British Islands, the Swedes towards Russia. Early Norwegian civilisation has been influenced from the west, particularly from England, with which intimate relations were long maintained, while Sweden has had more dealings with the east and with the south. The early Norwegian kings ruled over the Scottish Islands. In the thirteenth century the Swedes established a firm footing in Finland. Queen Margaret founded the Scandinavian Union of three nations in 1397, and a long period of unrest followed. Sweden broke from this union under Gustavus Vasa; but the less powerful Norway remained under Danish domination, and from 1537 to 1660 was a subordinate kingdom. During this period Sweden attained its climax of national greatness, and, especially during the Thirty Years' War under Gustavus Adolphus, occupied a distinguished place amongst the European Powers. Several provinces of Norway and Denmark were incorporated, and Sweden became the most powerful country of the north; but during the long wars of Carl XII. this place was lost, and Sweden fell under foreign influence, from which it was saved by Gustavus III., through his revolution of 1772. His son, Gustavus IV., involved the country in war with Russia and lost Finland in 1808. The Revolution of 1809 placed Carl XIII. upon the throne of Sweden. In 1810 the French Marshal Bernadotte, under the name of Carl Johann, was elected Crown Prince and succeeded in 1818. The idea of a union between Sweden and Norway, which had long been in contemplation, was rendered possible by the disruption of the bond between Norway and Denmark by the Kiel Treaty of 1814. Norway had at first proclaimed itself a separate kingdom, but the envoys of the Great Powers induced it to withdraw this proclamation after a short war; and a Norwegian national assembly then chose Carl XIII. as king of Norway, and on his death the Bernadotte dynasty succeeded peaceably to both kingdoms.

Since 1814 the history of both nations has been a record of great economic progress and of unbroken peace. Yet the hope of a complete incorporation of the two peoples once entertained by the Swedes, has not been fulfilled. Since 1885 the question of separate consular and diplomatic representation for Norway, in accordance with the spirit of the agreement of 1814, was a source of growing friction, and in 1905 the union was peaceably dissolved, Sweden retaining the old King, while the people of Norway adopted as their monarch a prince of the Danish royal house.

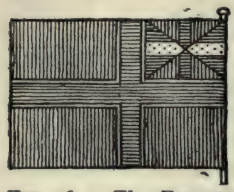

FIG. 96. — *The Former Norwegian Merchant Flag.*

The former flags of Norway and Sweden passed out of use, being altered to suit the new condition of things by the omission of the badge of union.

The Lutheran church has been established since the sixteenth century in both kingdoms.

SWEDEN

Government, People and Resources.—The name of Sweden is in the language of the country *Sverige, i.e.*, the kingdom of the Svears. The government, with its seat in Stockholm, where the King also resides, consists of a Minister and nine Councillors of State, these seven being heads of departments. The Swedish Parliament consists of two chambers, the elective franchise for both being limited.

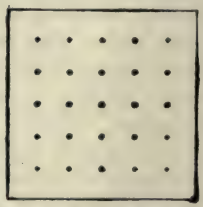

FIG 97.—*Average population of a square mile of Sweden.*

The population of Sweden is mainly agricultural, and several parts of the country are particularly well suited for the rearing of live stock. The most fertile districts are in the provinces of Scania and Halland, the Baltic Islands, the coast of Småland and western and eastern Gothland. Forestry is a very important source of wealth, the export of timber and forest products having the first place in the trade of the country. The tonnage of the merchant fleet is about 500,000. The Swedes have long been celebrated for their industries and for their excellent technical institutions; in recent years the progress in industrial matters has been rapid, the water power of the numerous rivers being largely utilised.

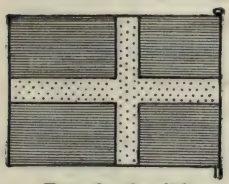

FIG. 98.—*Swedish Merchant Service Flag.*

The country possesses immense mineral wealth, particularly in iron, and Swedish mining has long been famous and has played a great part in the development of the country. The country is divided into separate mining districts known as *bergslager*. At the present time the immense deposits of very rich iron ore in Lappland, especially at Gellivara,

take the first place. The principal copper mines are at Falun, zinc is produced at Ammeberg, and silver at Sala; but there is scarcely any coal in the country except in Scania. Swedish iron has a reputation all over the world for its purity. The United Kingdom and Germany come first in the foreign trade, then Denmark, Norway, Finland, and Russia.

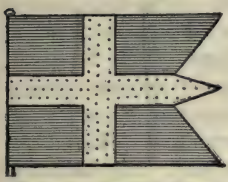

FIG. 99.—*Swedish Naval Ensign.*

The means of communication are excellent in parts, and everywhere good. A network of roads extends over the whole country. The admirable natural waterways have been improved by the construction of canals, of which the most important is the system between the Kattegat and the Baltic, including the Trollhätta and Göta canals and the great lakes. Steamer communication is kept up on the internal waterways and along the coast during the open part of the year. The railway system has been steadily improved, and Sweden now possesses a greater extent of railways in proportion to inhabitants than any other country in Europe. The system is naturally most developed in the lowlands in the south, but it extends also far to the north. The principal mail routes to the continent are from Stockholm to Trelleborg, and thence across the Baltic to Sassnitz on Rügen; and from Göteborg to Copenhagen by railway ferry at Helsingborg (Fig. 107). Telegraph and telephone systems are highly developed.

Education is general, almost every one can read and write; the school system is well organised and attendance is compulsory. There is a large and well-disciplined army, and the fleet, although formerly neglected, has recently been improved and increased.

FIG. 100.—*The Site of Stockholm.*

Divisions and Towns.—Sweden has been divided from remote times into two great parts, Svealand and Götaland, representing the historical distinction between different peoples and separated by the great forests of Tiveden, Tylöskogen, and Kolmården. The new southern provinces were joined to Götaland in the seventeenth century. Norrland, the third great division, contains all the districts northwards from Gefle.

In **Svealand** towns were first founded in the environs of the Mälar Lake, and here the magnificent capital is situated at the short outlet of the lake. *Stockholm* is one of the most attractive towns of Europe. From the

original city on an island the modern town has extended widely on all sides. It contains a great palace facing the quays, which is the chief residence of the king. There are many old palaces and public buildings, such as the Riddarhus, the common property of the Swedish nobility, the Riddarholmskyrka, the burial-place of royal dynasties, several rich museums, the great royal library, a university college for natural science, a technical high school, a medical college, great hospitals, several academies and learned societies, a new opera-house, and several theatres. The different parts of the town are connected by numerous bridges. The old town is called Staden, with Södermalm and Norrmalm on both sides, and Östermalm, the newest and finest part. The beautiful park Djurgården, and several royal palaces, form attractions in the environs. Stockholm, with its fine harbour, is the first trading-place of Sweden in regard to imports, but comes after Göteborg and Malmö for exports. It is the chief industrial town in Sweden, with manufactures of every kind. Stockholm is defended on the seaward side by the very strong fortress of *Oscar Frederiksborg*. Northward lies the ancient town of *Upsala*, with a venerable cathedral and the oldest Swedish university, founded in 1477. *Falun* has great copper mines.

Farther north, in **Norrland,** the prosperity of which is steadily increasing, the towns occur principally on the coast, and *Gefle, Sundswall, Hernösand, Umeå, Luleå*, and *Haparanda* are some of the many small seaports exporting wood and ores. In the interior, which also includes Lappland, there is only one little town, *Östersund*, on the Storssjö lake, a station on the railway to Trondhjem. From Luleå a railway runs to the rich iron mines of Gellivara, and thence across to the Ofoten Fjord on the Atlantic in Norway.

Götaland, which includes the most fertile provinces, especially Östergötland and Scania, is rich in towns. The largest is *Göteborg* (*Gothenburg*) on the Skagerrak, at the outlet of the Götaelf, the first port for Swedish exports, and the centre for a great traffic along the coasts and on the canals. The town is regular and fine, with many splendid buildings, but is inferior to Stockholm in regard to picturesque situation. Göteborg has a well-endowed university college with a faculty of arts. On the coast of the Kattegat stands *Halmstad*, and on the Sound, *Helsingborg* and *Malmö*, two flourishing and advancing towns, with large exports from the province of Scania. This province, distinguished by its many fine country seats, also contains the inland town of *Lund*, with an old cathedral, and the second university of Sweden, founded in 1668. On the coast of the Baltic there is a long succession of more or less important towns, including *Carlskrona*, the chief station of the Swedish navy, with wharves and docks. In the interior of Götaland there are many small towns, including *Wexiö*, the bishops' seat in Småland, *Jönköping*, at the south end of Lake Vetter, and on the Motala river, the great manufacturing town of *Norrköping*, the chief industrial town of Sweden. The great

manufactories of *Motala* stand on the same river. On Lake Vener there are several towns, including *Venersborg* and *Lidköping*; and on the canal where it enters Lake Vetter is the central fortress of *Carlsborg*. One of the most interesting Swedish towns is the ancient *Visby*, on the island of Gothland, in old times one of the first commercial places on the Baltic and a member of the Hanseatic League, but now remarkable for its splendid ruins of churches and magnificent old walls. The population of the Swedish towns is 20 per cent. of that of the whole country. The peasants live mostly in farms, but in the south they also dwell in villages.

NORWAY

Government, People and Resources.—The native name of Norway is *Norge* from *Norvegr*, which means the Northern Way. The King exercises his functions through a Ministry of State and at least seven Councillors or Ministers. The government is that of a democratic monarchy; the royal veto being limited to the extent that if a bill to which the royal assent has been refused is passed by three consecutive Storthings it becomes law. The legislature is in the hands of the Storthing (Parliament), elected by delegates who are chosen by universal suffrage. This assemblage has also exclusive power in finance.

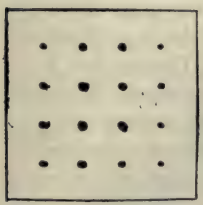

FIG. 101.—*Average population of a square mile of Norway.*

The people of Norway are to a great extent agriculturists, although the country cannot produce corn enough for its inhabitants, and needs a great import. A large percentage of the people are seamen; the merchant fleet, only inferior in Europe to the British, had a tonnage of 1,500,000 in 1901. Industry has long been at a very low level, but is now increasing, the country possessing great waterfalls, which can supply power to the factories. In many parts of the kingdom there are rich mines, Kongsberg (silver), Eidsvold (gold), Röros and Sulitelma (copper), being the best known. Most of the foreign trade is done with the United Kingdom, Germany, Sweden, and Denmark. The fisheries of cod and herring are of great importance, especially those of Lofoten and Finmarken. Along the coast and on the fjords, communication is kept up by steamers all the year round, up to the Russian frontier on the Arctic Sea. Several lines of steamers connect Norway with the continent and the British Islands. The roads are built by government engineers, many of them being works of high technical skill. The railway system, also for the most part belonging to government, is only complete in the south-east. Between Christiania and Trondhjem a line follows the valley of the Glommen.

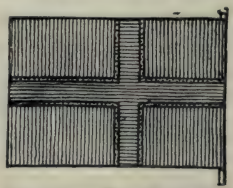

FIG. 102.—*The Norwegian Flag.*

Railways are now being constructed around the country, between Bergen and Christiania, and from Trondhjem towards the north. Three different lines connect Norway with Sweden. The great mail route is the southern railway *viâ* Göteborg to Copenhagen, by which the journey from London to Christiania may be made in less than sixty hours. The telegraph and telephone system has attained a high development, especially for the convenience of the fishing population in the remoter districts.

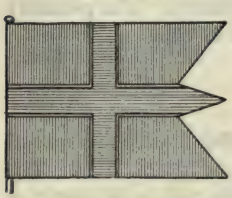

FIG. 103.—*Norwegian Naval Ensign.*

Education receives particular attention from the State and from local authorities, and is compulsory. The elementary and higher schools are well equipped. The army and navy were long neglected, but are now improved, and important fortification works have recently been carried out.

Divisions and Towns.—From old times Norway has been divided into two great divisions, the Nordenfjeldske and Söndenfjeldske or Northern and Southern Districts ; the Vestenfjeldske or Western District has been formed later. The *Söndenfjeldske* includes the lowlands around Christiania Fjord and Lake Mjösen, together with the great central valleys. *Christiania* (sometimes spelt *Kristiania*), is the real centre of the country, situated at the northern end of the long Christiania Fjord, which forms a splendid harbour. The city is the capital of Norway, the seat of the Government and of the Storthing. It contains a university, founded in 1811, a learned society, several museums for science and arts, among them a museum of northern antiquities, the richest in objects from the Viking period. Christiania is the first commercial centre of Norway. The town is beautifully situated among wood-clad hills, but much of it is irregularly built. Many flourishing towns are situated along the coasts of Norway on the fjords and islands. Close to the Swedish frontier is *Frederikshald*, with the celebrated fortress of Frederiksten, and at the estuary of the river Glommen *Frederikstad*, one of the chief centres of the timber trade. *Drammen*, on the western side of Christiania Fjord, another centre of the export of timber. *Horten*, with *Carljohansvaern*, the chief station of the Norwegian navy ; *Tönsberg*, the oldest town of Norway, and one of the head-quarters for Arctic sealing ; *Christiansand*, and other busy seaport towns, stand on Christiania Fjord, or on the Skagerrak.

FIG. 104.—*The Site of Christiania.*

Stavanger, one of the oldest towns of Norway, stands on the Atlantic coast at the south end of the great line of western islands. *Bergen*, further north on the west coast, was once the first, and is now the second, town of the country, and from the oldest times it has been the chief place in northern Europe for the fishing trade. In the fourteenth century the Hanseatic League founded an establishment there, which remained for four centuries. There are many remains from former times, including old churches, the royal hall, and the tower of Bergenhus. It is now a flourishing commercial town, with an intelligent and vivacious population; it has a great museum and a biological station. *Christiansund* is an important place for fishing. *Trondhjem*, one of the oldest towns (it was founded in 997), and now the third in importance, is the northern terminus of the railways, with lines running south to Christiania and east to Sweden. The magnificent ancient cathedral is the coronation-place of the kings of Norway. Next to Bergen, it is a centre for steamer trade, and in summer for the immense tourist traffic attracted by the smooth seas and romantic scenery of the fjords. In the far north, beyond the Arctic circle, there are several flourishing little wood-built towns, centres for fishing in winter and for tourists in summer, including *Bodö*, *Tromsö*, and near the North Cape, *Hammerfest*. Beyond the North Cape are *Vardö*, the Wardhouse of the first English Arctic explorers, and *Vadsö* on the Varanger Fjord in the extreme north-east.

The towns of Norway contain about 25 per cent. of the population of the whole country. In the country the people live on their farms; villages are unknown. It is an exception to find a town not situated on the sea; the only inland towns are near mines, or on the shores of Lake Mjösen, among them the episcopal seat of *Hamar*. The rural population centres round the four large cities, Christiania, Hamar, Bergen, and Trondhjem; especially round the two former.

STATISTICS

NORWAY.

	1875.	1890.	1900.
Area of Norway in square miles	124,454	124,454	124,454
Population of Norway	1,813,424	2,000,917	2,239,880
Density of population per square mile ..	15	16	18

	1890.	1900.
Population of Christiania	151,239	227,626
" " Bergen	53,684	72,251
" " Trondhjem	25,065	38,180
" " Stavanger	23,899	30,613

ANNUAL TRADE OF NORWAY (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	6,300,000	8,100,000	11,900,000
Exports	4,880,000	5,700,000	7,000,000

SWEDEN.

	1880.	1890.	1900.
Area of Sweden in square miles	170,722 ..	170,722 ..	170,722
Population of Sweden	4,565,668 ..	4,774,400 ..	5,136,440
Density of population per square mile ..	26 ..	28 ..	30
Population of Stockholm	168,706 ..	246,454 ..	300,624
„ „ Göteborg	76,500 ..	104,657 ..	130,619
„ „ Malmö	38,082 ..	48,504 ..	60,857
„ „ Norrköping	26,924 ..	32,826 ..	41,008
„ „ Gefle	18,749 ..	23,484 ..	29,522

ANNUAL TRADE OF SWEDEN (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	12,400,000	17,700,000	19,500,000
Exports	10,700,000	13,500,000	17,700,000

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II.—DENMARK

BY THE EDITOR.

Position and Coasts.—The name Denmark is properly *Danmark*, the mark, marches or frontier of the Danes. Jutland (in Danish *Fyland*), the northern portion of the Cimbrian Peninsula occupied by Denmark, lies between the same parallels of latitude as Scotland south of Inverness. The western shore facing the North Sea is low, sandy and unindented, but behind the sandy beaches and lines of dunes there are several large lagoons. A long, narrow, curved sand-spit called the Skaw or Skagen, forms the tip of the peninsula. The east coast is somewhat higher and more indented; a number of its inlets form safe harbours for small vessels. The two largest islands of Denmark stretch between the south of Jutland and the south of Sweden, separated by the shallow and tortuous *Little Belt* between Jutland and Fünen, the wider and deeper *Great Belt* between Fünen and Zealand, both leading into Kiel Bay, and the *Sound* between Zealand and Sweden. The historic greatness of Denmark depended on the command of these channels, and the importance of having them in the possession of a neutral Power in case of war has probably preserved this small kingdom from absorption in any of its larger neighbours.

Surface and Resources.—The west and north of Jutland consist of heather-covered moorland which yields peat for fuel. The south-east and the islands, being traversed by the western extremity of the Baltic coast-ridge, are hilly, and full of variety of landscape, although the highest summit is less than 600 feet above the sea. No coal or metallic ores occur in the country; the soil is everywhere underlain by recent rocks. The hills and vales of Denmark were originally thickly covered with beech

forest, and although most of the land is now cleared for pasture and the growth of oats, barley and, rye, extensive woods still remain. The climate resembles that of eastern Scotland, but is a few degrees colder in winter and warmer in summer. It is, however, less extreme than the climate of central Germany. Although the Sound and other channels are often blocked with drifting ice in winter, they are rarely closed to navigation for any time.

People and History.—The early Cimbrian race were succeeded by Teutonic tribes, who from Jutland and other parts of the Baltic and North Sea shores descended upon the coast of England, forming the English people. The Scandinavian Danes from the Baltic Islands then obtained a footing on the peninsula, and the power of their kings extended over Norway, the south of Sweden, and England. Denmark has remained free of foreign control, but in the seventeenth century it lost the last of its territory in Sweden, and in 1814 Norway was separated from the Danish crown. The German-speaking people of the duchy of Holstein, in the south, who had, during previous centuries, sometimes been subject to the King of Denmark, at other times to the German Emperor, became dissatisfied; and in 1864, after a war between Denmark and Prussia, the duchies of Schleswig (Slesvig) and Holstein were incorporated with the kingdom of Prussia.

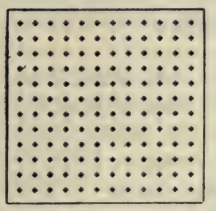

FIG. 105.—*Average population of a square mile of Denmark.*

The Danes have always been enterprising and persevering in war and commerce, winning for themselves colonies in Greenland, Africa, and the West Indies, but the tropical possessions are now reduced to the three small islands of St. Thomas, St. John, and St. Croix, while Iceland is a separate country acknowledging the Danish crown. At home more than half the people make their living by agriculture, the rest by manufactures, by trade, fishing, and as sailors, many of them serving on British and other foreign ships. The form of government in Denmark is a limited monarchy, with a parliament of two houses, both elected by the people. Practically every man has a vote. The Lutheran Church is established by law, and education has long been universal. The land is divided up into a great number of small farms. Butter-making is the greatest industry of the country, being carried on by scientific methods, and butter forms more than half the value of the exports. There are few manufactures. Textile fabrics, metals, and coal are the principal imports. Most of the foreign trade is done with the United Kingdom, which takes more than half the exports, and Germany, which sends about one-third of the imports. The

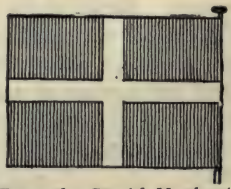

FIG. 106.—*Danish Merchant Service Flag.*

railway system is very complete, the trains being ferried across arms of the sea in steamers, and most of the lines belong to the State.

The Islands of Denmark.—Zealand (or Seeland), with the detached portions forming the picturesque islands of Laaland, Falster, and Moën to the south, form the eastern division of Denmark, flanked on the east by Sweden, and on the south by Germany; its indented coasts are deeply penetrated by the water of the Kattegat and the Baltic. *Helsingör* (Elsinore) will be remembered as the scene of Shakespeare's "Hamlet," and from the reference of Campbell in his description of the battle of the Baltic, but both descriptions are geographically at fault, the shores are low, and the castle stands at the level of the sea.

Copenhagen (*Kjöbenhavn*=Merchant's harbour), the one large town of Denmark, is situated near the widest part of the Sound where the island of Amager helps to form an excellent harbour. It is strongly fortified by a series of modern batteries occupying artificial islets, hardly showing above the water. The town is handsomely laid out, with gardens and fine public buildings; it is the seat of government, the residence of the king, and contains a university and several learned societies. Copenhagen concentrates the maritime trade of Denmark, as no other harbour can receive large vessels. *Korsör*, at the south-west of Zealand, and *Giedeser*, at the south of Falster, are steamer ports for the express routes to Kiel and Warnemünde (for Berlin). The richly cultivated island of Fünen (or Fyen), with Langeland and a maze of smaller islands to the south, forms the western shore of the Great Belt, which is crossed by ferry-steamers to *Nyborg*, whence a railway passes through the ancient town of *Odense* to *Strüb* on the Little Belt.

FIG. 107.—*Railway and Steamer routes in Denmark.*

Jutland.—Jutland, though nearly twice as large as the islands, contains rather fewer inhabitants. Almost all the harbours lie on the Kattegat coast, and the southern and eastern parts of the peninsula are the most thickly peopled because agriculture is the mainstay of the people. *Aalborg*, on the narrowest part of the Liim Fjord, where it can be crossed by a railway bridge, and reached by small vessels from the Kattegat, is the chief commercial centre of the north. At *Thisted*, on the wide lagoon of the Liim Fjord in the west, Malte-Brun, the author of a celebrated French treatise on geography, was born. *Aarhuus*, on the east coast, is the largest town of Jutland, with a busy harbour. Further south

Horsens, *Veile*, and *Kolding*, stand each at the head of a short fjord in the heart of beech forests. *Fredericia* is the railway harbour for Strüb in Fünen, on the route to Copenhagen which has the shortest sea passage. *Esbjerg* on the North Sea is an important and growing port.

Bornholm.—When the southern provinces of Sweden were given up by Denmark, the rocky island of Bornholm in the Baltic was also ceded; but the people of the island massacred the Swedish troops who came to take possession, and the island has remained part of Denmark. The lofty cliffs of granite and ancient sedimentary rocks are entirely different from the rocks of Denmark, and the island yields building stone and even a little coal. The principal town is *Rönne*. The chief value of Bornholm is as a lighthouse station.

The Faroes (*i.e.*, sheep islands) form a group of twenty-two small islands situated nearly mid-way between Shetland and Iceland on the great submarine ridge that runs from Scotland to Greenland. They are composed of volcanic rocks, in large part of horizontally bedded basalt, which once appear to have formed a plateau of great extent. This ancient plateau had been deeply cut into by river-valleys running parallel to each other from north-west to south-east, and by subsequent subsidence the valleys became fjords or sounds, cutting up the land into a succession of long narrow islands or peninsulas. The climate is very equable, and the people make their living by sheep farming, the capture of sea-birds, chiefly loons, and fishing. They are of Norwegian descent, and speak an old Norse dialect, although Danish is the official language. The one town is *Thorshavn*, on the east coast of Stromö, the largest island; a little place of wooden houses, frequented in summer by fishing vessels.

STATISTICS.

	1880.	1890.	1900.
Area of Denmark (square miles)	15,280 ..	15,289 ..	15,289
Population of Denmark	1,980,259 ..	2,185 335 ..	2,449,540
Density of population per square mile ..	129 ..	143 ..	160
Population of Copenhagen (without suburbs)	235,254 ..	312,859 ..	378,237
„ Aarhuus	24,831 ..	33,308 ..	51,814
„ Odense	20,804 ..	30,277 ..	40,138
„ Aalborg	14,152 ..	19,505 ..	31,457

ANNUAL TRADE OF DENMARK (*in pounds sterling*).

	Average 1871–75.	1881–85.	1891–95.
Imports	6,000,000 ..	14,000,000 ..	18,800,000
Exports	4,700,000 ..	10,000,000 ..	14,100,000

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III.—ICELAND

By Dr. Thorvald Thoroddsen,[1]

Position and Surface.—Iceland is a large island in the North Atlantic Ocean on the edge of the temperate zone. The arctic circle touches the most northerly points, and the south of the island lies in 63½° N. Many fjords cut their way into the steep coast on the west, north, and east; but the south coast is without indentations, and close to the sea is very low and sandy. The largest bays are in the west—Faxaflói and Breidafjördur, and north of the latter a nearly isolated

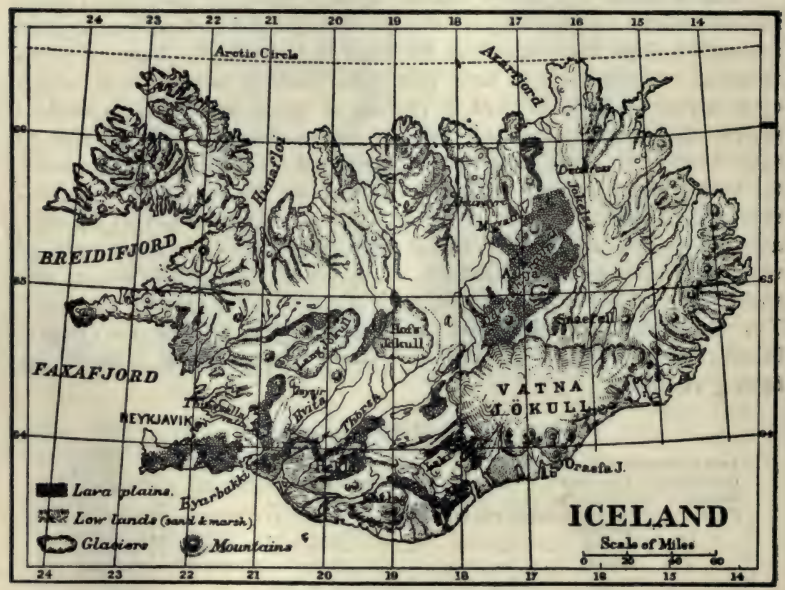

FIG. 108.—*Iceland*

peninsula, intersected by many fjords, stretches to the north-west. Iceland is mainly composed of volcanic highlands, with an average height of about 2,000 feet; lowlands are only found in the south and south-west, and form only one-fourteenth of the whole area. They are all produced by river deposits silting up the heads of bays or fjords. The highlands bear several large snowfields, of which Vatnajökull is the largest, all producing glaciers which give rise to large rivers. The snow-level is lowest (1,300 feet) in the north-west, and highest (3,500 to 4,000 feet) in the centre.

[1] Translated from the Danish by Fru Backer-Lund.

The highest parts of the country are in the south-east, the highest point in the southern ridge of Vatnajökull being Öræfajökull, which reaches 6,241 feet. Most of the Icelandic rivers are short, but full of water, flowing strongly and broken by many waterfalls. The longest rivers (80 to 100 miles) are the Thórsá, Olfusá, and Jökŭlsá in Axarfjord, the last with the imposing waterfall of Dettifoss. There are several lakes, the best known being Thingvallavatn.

Geology.—Iceland is built up of volcanic masses of Tertiary age; two-thirds of the country consists of basalt in horizontal beds of gentle dip with steep escarpments and cliffs falling to the sea, exactly as in the Faroes. Right across the country there runs a belt of tuff and breccia, occupying about one-third of its area. There are more than 100 volcanoes, of which 25 have been in eruption during historical times. Some have the same conical form as Vesuvius; others are broad and of very gentle slope, like Mauna Loa in the Sandwich Islands; but most of the eruptions have come from fissures on which a long row of low craters have been formed. These volcanoes have produced large lava fields, which together cover an area of about 4,000 square miles. The best known volcanoes are Hekla, Katla, and Askja, the crater of which covers an area of 16 square miles. Katla is, like several other Icelandic volcanoes, covered with glaciers, which during the eruptions melt and cause dreadful inundations. Earthquakes are very common, and have often done great injury both to life and property. There are many hot intermittent springs, of which the Geysir is most famous, and its name is often applied to such springs as a general term.

Climate and Productions.—Iceland has an insular climate, which is much warmer than the latitude would suggest. In the south the winter is mild and the summer proportionally temperate; the mean temperature of the year in Eyarbakki, in the south, is 38·5° F., and for Akureyri, in the north, 36° F. The climate is rather wet and very stormy; but snow does not lie long on the coast in winter, and many harbours in the west are never frozen. The highlands are very cold, and snowstorms are common even in summer. In the north of the island the climate is also cold, with a greater range between winter and summer. Floating ice from Greenland often blocks the north coast, stopping the shipping trade and the fisheries, and affecting the climate adversely. The vegetation has a European-Arctic character; here and there small woods of stunted beech and a very few mountain-ash trees occur. The natural pastures are excellent, and sheep thrive well; rich grass fields always surround the farms, and the hay yielded by them is used for the cattle. There is no other agriculture, even barley rarely ripens. Foxes are the most common animals, and polar bears sometimes come with the floating ice. The sea abounds with all sorts of fish, of which cod, herring, and flounders are amongst the most important; and whales and seals are also plentiful. The coast is crowded with sea-birds; the eider-duck is

of great importance to the inhabitants, and is tended almost like a domestic animal.

History.—Iceland was first discovered by Irish monks about the year 790. It was next visited by Norwegian vikings in 870, and was colonised from Norway in the years 874 to 930. An Icelandic republic was then established with an aristocratic form of government, which lasted till 1262, when the country entered into a personal union with the kingdom of Norway. That was the golden age of Icelandic culture, and it is memorable for the splendid poetic and historical literature contained in the Edda and Sagas. The early Icelanders were daring sailors. They colonised Greenland in 982, and discovered America in 1000. After the year 1262 the prosperity of the country declined, mainly because of successive misfortunes, volcanic eruptions, plague, and bad government ; and practically it is only since 1874 that it has begun to recover ; but now there is progress in all directions. Together with Norway, Iceland in the year 1389 came under Denmark, and it has since belonged to the Danish crown. In 1874 a separate free constitution was granted, with a legislative assembly (Althing), a Governor-General (Landshöfding) in Reykjavik, and an Icelandic ministry in Copenhagen.

People.—Only the lowlands, the coast, and the valleys are inhabited. The great highland area cannot support any inhabitants, for except a little grass on its outer slopes it consists only of bare ground, lava deserts, and snowfields. Trade was in olden times carried on by Icelanders and Norwegians. In the fifteenth century English sailors took a large share, and in the sixteenth German influence preponderated. From 1602 to 1786 there was a Danish government monopoly ; in 1786 trade was thrown open to all Danish subjects, and in 1854 to all nations. At present the trade both with Great Britain and Denmark is chiefly carried on by Icelanders. The chief exports are fish, cod-liver oil, salmon, sheep and horses, salted mutton, wool, fur, eider-down, and feathers. There is no manufacturing industry. Most of the inhabitants live by breeding cattle, especially sheep ; a smaller number by fishing, with much risk to life, in open boats. On the great fishing banks French and British fishing-vessels of larger size are at work, while the Norwegians carry on whale hunting from stations on the coast. Many horses have to be kept because they furnish the only means of transport in the country, and the only roads in most places are bridle paths. Recently, however, good roads for driving have been commenced, and bridges are now being built over the rivers.

The Icelanders still talk old Norwegian (the Saga language) almost unchanged, and every child can read the ancient Sagas. There is a good deal of current literature, and more books and newspapers are published per head of the population than in any other country. Education is universal and thorough. Nearly all the people belong to the Lutheran Church.

Postal communication with abroad is by steamers from Copenhagen calling at Leith in Scotland, and the Faroes. In summer there is also a

regular steamer service all round the coast. A telegraph cable connects Iceland through the Faeroes with Scotland. *Reykjavik*, the capital, and the only town, is built on a little projecting point in the south-eastern part of Faxaflói. Here the Althing is held, and the Governor-General and the Bishop of Iceland reside. Reykjavik has classes for medicine, theology, classical languages, and navigation, and there is a national library, a collection of antiquities, and a national bank. In the centre of the town there is a statue of the famous sculptor, Albert Thorwaldsen, who was of Icelandic origin.

STATISTICS.

Area of Iceland (square miles)	30,432
Area of habitable portion (square miles)	6,784

	1880.	1890.	1895.
Population of Iceland	72,445	.. 70,927 [1] ..	73,449
„ „ Reykjavik	2,567	.. 3,886 ..	4,222

ANNUAL TRADE OF ICELAND (*in pounds sterling*).

	Average 1881–85.	1891–95.
Imports	340,000 ..	356,000
Exports	310,000 ..	340,000

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J. Coles. "Summer Travelling in Iceland." London, 1882.
W. Bisiker. "Across Iceland." London, 1902.

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[1] From 1880 to 1890 there was a great emigration to America, chiefly to Manitoba, but this has now almost ceased.

CHAPTER XIV.—THE LOW COUNTRIES

I.—THE NETHERLANDS

By Dr. C. M. Kan,[1]

Professor of Geography at the University of Amsterdam.

Position and Geology.—Although one of the smallest countries in Europe, the kingdom of the Netherlands (*Nederland*=low country), or Holland (so called from its most important province, Holland, derived from *Houtland, i.e.*, Woodland), is one of the most noteworthy. It lies between 50° 45′ and 53° 32′ N. latitude, and between 3° 25′ and 7° 12′ E. longitude, on the north-west coast of central Europe, at the mouths of the Scheldt, Maas (Meuse), and Rhine. Its importance results from its position, its commerce, and its colonies.

Traces of Coal Measures, Chalk, and Tertiary sands and loams cover less than 1 per cent. of the area, and appear only in the extreme east and south-east, while the most recent Quaternary formations, diluvium and alluvium, occupy respectively 40 and 59 per cent. of the surface. In the south the Maas and the Rhine have co-operated in the formation of the diluvium; and in the north the inland glaciers of the Ice Age. In their period of enhanced activity consequent on the Great Ice Age, the Maas and Rhine brought down coarse sand and grit; but at a later time principally finer sand. The diluvium of the northern provinces, being of Scandinavian origin, contains coarse gravel and loam, in addition to the sand; it also lies higher, its surface is less flat, and forms more distinctive watersheds between the rivers of that part of the country. Vegetation, rivers, the sea and wind have combined in the formation of the alluvial strata. Plant remains have given origin to the fens and arable lands, and contributed to the formation of the iron-ore, found in the badly drained parts of the smaller river basins in the east, and the loess which occurs in the south of Limburg only. The high fens, which consist of heath, cotton-grass, rushes, moss, and sometimes trees, only occur upon the higher sandy soils; they are found principally in the south and east of the country, and lie above the ordinary level of the water. The low fens in the north and west owe their origin largely to marsh plants, and frequently rest upon clay of high fertility. In process of time the sandbanks deposited in the sea develop into sand-spits; then the sea builds up chains of marine dunes upon them, shutting off a haff or lagoon against the land. It is in such

[1] Translated from the Dutch by J. T. Bealby.

lagoons that the greater number of the low fens have been formed. The most recent deposits of fluvial clays stretch chiefly east and west along the Rhine, the Waal, and the Maas, occurring more especially between the diluvial regions of the north and those of the south of the country. In the west recent marine clays have been deposited along the

FIG. 109.—*The Netherlands, showing height of land.*

edge of the diluvial strata. Wind has played an active part in the formation of the sand-dunes, which still occupy extensive areas in the Veluwe, in Drenthe, and in North Brabant.

Reclamation of Land.—Human energy has materially supplemented the operations of natural forces by draining the marshes and trenching the fens, by fighting against the drifting sand, protecting the coasts with dunes and dykes, regulating the rivers and carrying out other works. Polders are low-lying inland tracts protected by means of dykes and mounds against the invasion of water from the higher land around them,

the superfluous water being at the same time pumped out and led away. By embanking the lands along the sea shore which are not sufficiently high, they are wrested from the dominion of the ocean, protected by dykes or banks, and gradually transformed into the most fertile districts. Thus the land that has been destroyed by the sea, which in 1894 amounted to a larger area than the united provinces of North Brabant and Limburg, is being to some extent made up for by reconquests of better land.

Configuration.—The lowest-lying part of the Netherlands is on the west, bordering the sea (Fig. 109). With the exception of the narrow strip of sea-dunes, which have a mean height of 30 feet, nearly a quarter of the surface of the country lies between sea-level and 8 feet below, while about half as much lies between sea-level and 3 feet above; in other words, 38 per cent. of the surface would be overflowed by the ocean were it not protected by dunes and dykes. Some of the lower-lying tracts, consisting exclusively of reclaimed fens and marshes, are actually from 5 to 15 feet below sea-level. The remaining 62 per cent. of the surface on the whole forms a series of belts or zones stretching from south-west to north-east. In Drenthe, Gelderland, Overysel, Utrecht, and Limburg there are hills of gravel and sand ranging from 150 to over 300 feet in elevation; and in the south-east of Limburg, the region of the old rocks, the highest elevation of the kingdom attains an altitude of 1055 feet. Small as these altitudes may appear they have produced their effect upon the flow of the rivers, drainage, the fertility of the soil, the climate, and even on the construction of roads and railways. The differences of level and relief themselves are largely due to the action of the glaciers of the Great Ice Age and their moraines.

Rivers and Canals.—From the higher-lying diluvial tracts and gravel hills of Drenthe and Groningen a number of small streams radiate through diluvial valleys into the adjacent provinces; and many short streams also flow westward from the east of Overysel and Gelderland. Elsewhere the minor streams make their way into the channels deserted by the larger rivers—for instance, the Eem and the Ysel, and in the south the Aa, Dommel, and Mark. The larger rivers do not follow the natural inclination of the diluvium, but flow in the direction of the general slope of the country, or from south-east to north-west. The east to west direction of the Rhine, Waal, and Lek is the most influential factor in determining their economic importance, since it makes them the chief natural highways between central Germany and the sea. Four-fifths of the river trade of Holland is carried by the Rhine and the Waal, these rivers being international waterways.

The most important canals, from 12 to 25 feet deep, are the North Sea Ship Canal, connecting Amsterdam and the sea (Fig. 112); the Rotterdam Waterway, giving that city easier access to the North Sea; the Canal of South Beveland connecting with the Scheldt; the Merwede Canal and the King William Navigation, uniting various rivers with one another; and the canals which terminate at the Helder and the Dollart. Minor canals

serve for the transport of turf, and for communication between towns. Rotterdam, Amsterdam, and Flushing have a trade of nearly nine million tons between them, as compared with scarcely more than two million tons for all the ports not situated on the deep rivers or ship canals.

Coast.—The characteristic features of the western coast are sand-banks, mud-flats, high dykes (embankments), and sand-dunes, with a shallow, gently sloping shore. Further north a series of low islands marks the former coast line ; indeed some of them still possess dunes. The sandy shallows are covered with water by the tides, otherwise they would be cut off from direct communication with the existing coast and the Zuider Zee.

Natural Productions, Flora and Fauna.—Mineral products are limited to a very little coal from the mines of Limburg, bricks from the marine and fluvial clays, sandstone from quarries near Maastricht and elsewhere, and some bog-iron ore. Both the diluvial and alluvial lands are adapted for agriculture and grazing ; these occupations utilise respectively 26 and 35 per cent. of the total area ; 7 per cent. is planted with forest, and about 20 per cent. is waste. The vegetable products of the sandy soils are principally rye, buckwheat, and potatoes, and thus differ from the chief products of the fluvial and marine clays—hops, rape-seed, sugar-beets, tobacco, and wheat. Orchards, market-gardens, and the characteristic Dutch industry of flower-gardening, occupying together 1½ per cent. of the country, are found principally on the *geest* or higher grounds along the edge of the marshes on the sandy soil, and in the reclaimed lands of the west. The different character of the soil in different parts occasions variations in the breed of horses, oxen, and sheep ; but does not affect the goats and swine to the same extent.

Climate.—The climate of the Netherlands is determined by the position of the country between 50° and 53° N. latitude, by its situation on the eastern shore of the North Sea, and by its low elevation. The mean of nearly fifty years' observations at Utrecht gives an annual temperature of 50° F., with a mean of 49° for the spring and autumn months, 66° for summer, and 34·5° for winter. Owing to the proximity of the sea, the winters are not cold, nor the summers unpleasantly warm. The water of the North Sea, which, as observed on the North Helder sandbank, has a January mean temperature of 46° F., and a July mean of 60° F., is also an influencing factor. The average annual rainfall amounts to 28 inches ; rain falls on 204 days in the year on an average, snow on 19, and thunderstorms occur on 18. The wind blows from the sea from directions between south-west and north for 219 days in the year on the average ; and from the land, from directions between north-east and south, for 146. The greatest quantity of rain falls upon and behind the maritime dunes. But the east differs most from the west in the smaller degree of its moisture and evaporation, both very important factors in the polders or reclaimed lands. There the people suffer considerably from the drawbacks of the climate, especially its variability, and the prevalence of diseases affected by it.

Consequently in the western lowlands the death-rate is relatively highest —30 to 40 per 1,000, as compared with 20 to 30 per 1,000 in other parts of the kingdom.

People and History.—The people of the Netherlands trace their origin to three Teutonic races the *Frisians*, who now preponderate in the west and north-west, and are best represented in the province of Friesland; the *Saxons*, in the east and north-east as far as the Ysel and Rhine; and the *Franks*, in the south, extending northwards a little beyond the Rhine. The three types differ in dialect, in the plan of the villages, styles of the houses, racial character, dress and customs. The fact that the Frisians inhabit chiefly the clay soils and low fens, the Saxons the diluvial tracts of the east, and the Franks the river-clays and diluvium of the south, has helped to maintain these differences. The races are now welded together into one people by the possession of a common written language, *Dutch* (neither "Hollandsch" nor Low German), and in cultured circles a common spoken language also. After Dutch the most important language of the Netherlands is Frisian, which possesses a separate literature, but is not officially recognised.

After the Roman supremacy came to an end the country was subdivided into various counties, duchies and bishoprics, which were reunited under the rule of the Dukes of Burgundy; separated from the German Empire, and enjoyed autonomy under Charles V. (1548). The Eighty Years' War of Independence against Spain followed; and after a lapse of time the country developed into a commercial and colonising State under the Statholders of the House of Orange-Nassau, its complete independence as a free republic was recognised at the Peace of Munster in 1648. The civil liberty and religious toleration which the Dutch so jealously guarded attracted large numbers of strangers—Flemings, Walloons, Huguenots, and Germans, who paid for the hospitality extended to them by fostering the commerce, and especially the industry of the Netherlands. After the abolition of the republic and the establishment of the sovereignty of the House of Orange, the year 1848 marked a fresh era in the political life of the nation by introducing a new and more liberal constitution, initiating reforms in economic and social matters, and developing the colonies to a high pitch of prosperity.

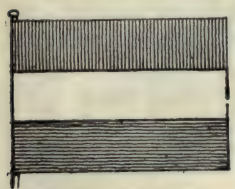

FIG. 110.—*Flag of the Netherlands.*

Government.—According to the constitution of 1848, the Netherlands forms a hereditary limited monarchy. The legislative power is shared by the Crown and the States-General, which includes a First Chamber of thirty members, and a second chamber of a hundred members. The executive powers of the Crown are delegated to eight responsible Ministers, and a Council of State of fourteen members. For administrative purposes the country is divided into eleven provinces and 1,123 communes; the former

governed by the Provincial States and a Royal Commissioner, the latter by the communal council and magistrates with a burgomaster or mayor.

Occupations.—Fully one-third of the productive workers are occupied in agriculture, the breeding of cattle, gardening, and so forth ; about the same number in manufacturing industry and trade ; one-sixth in commerce, on railways and other means of communication ; and a much smaller proportion in fishing. Agriculture on the clay soils, the sandy soils, and in the fens differs not only in its staple products but also in the methods of cultivation employed. Large estates are rare, and those which exist are chiefly confined to the clay soils. Tenant farmers preponderate in the provinces of Utrecht, Friesland, South Holland and Zealand ; in the other provinces peasant proprietors. After agriculture in order come the textile industries, principally developed in Overysel and North Brabant ; the working of metals for ship-building and agricultural implements ; the manufacture of paper and leather ; of chemical products, sugar, spirits and food materials, especially butter and cheese. More than three-quarters of the factories belong to the provinces, Overysel, North Brabant, North and South Holland.

Trade.—The products of agriculture and stock-breeding, and of such manufactures as margarine, sugar, textiles, iron-ware, quinine, constitute the more important articles of commerce. The trade of Holland is chiefly carried on with Germany, the United Kingdom, Belgium, Java and Russia. These countries send to the Netherlands about 90 per cent. of the total imports, and take about 75 per cent. of the total exports. Very many of the trading steamers sail under foreign flags, chiefly British, German, and Norwegian.

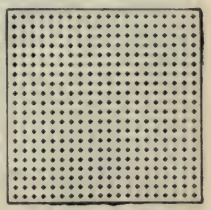

FIG. 111.—*Average population of a square mile of the Netherlands.*

Trade and commerce, both foreign and inland, are greatly facilitated by a network of nearly 9,500 miles of roads and dykes practicable for vehicles, by about 7,000 miles of tramways, mostly worked by steam, and approximately 2,000 miles of railways, which are connected with the systems of the adjacent countries at several points in the east and south.

Fishing is prosecuted principally in the North Sea ; but a large number of fishermen work in the Zuider Zee, in the rivers of South Holland and Zealand, and off the coasts of Groningen and Friesland.

Density of Population.—The density of the population varies with the means of subsistence and the degree of concentration in large cities, the range amongst the provinces being from 127 to 816 per square mile. But here the determining factor is the fundamental character of the soil. When the kingdom is mapped according to the soils, it appears that the higher gravel lands of Groningen and Drenthe, the sandy tracts and unreclaimed fens of North Brabant, and the regions of the dunes and sand-drifts, all show a density of population less than 65 per square mile ; the lower-lying diluvium of Scandi-

navian origin, the intermediate diluviums of Overysel and Gelderland, the low fen pastures, the tracts adjacent to the sea-dunes on the islands of South Holland and Zealand, have a density of 65 to 125 per square mile ; the non-diluvial tracts in the interior of Groningen and Friesland, in the south-west of Drenthe, in the east of Overysel, and the diluvium of Limburg have from 125 to 250 per square mile ; a few settlements in Groningen, the valley of the Ysel, the fluvial clays of the Maas, Waal and Linge, the industrial regions of Brabant and Limburg, the reclaimed polders and certain of the marine clay districts—all exceed 250 per square mile ; and finally, in the neighbourhood of Maastricht and of Eindhoven, the banks of the Noord and Maas, the vicinity of the large towns of North and South Holland, the density exceeds 500 and in some places even 1,000 per square mile.

The Large Towns.—The size of the towns and their importance depend upon the same conditions as the density of population. The kingdom contains twenty-one towns, each possessing a population of more than 20,000, and at least one of these is found in each of the five sub-divisions just enumerated ; the larger towns being more frequent on the richer soils. The chief towns in the north-east are *Groningen*, a market for agricultural products, a shipping centre, seat of a university, and provincial capital ; *Leeuwarden*, the capital of Friesland, and an important cattle-market for the trade with England *viâ Harlingen ; Zwolle* and *Deventer*, the chief live-stock and corn markets of Overysel. These towns possess but little industry. *Arnhem* and *Nijmegen*, the principal towns on the fluvial clay soils, attract many inhabitants by reason of their picturesque surroundings, their active river trade, and their important markets. In the south of the kingdom are the fertile districts and manufacturing centres of *Breda*, *Tilburg*, *s'Hertogenbosch* (*Bois-le-Duc*) in North Brabant and *Maastricht* in Limburg. The last two are also provincial capitals. The most important city in the centre of the kingdom is *Utrecht*, on soil intermediate between the pure clays and the pure sands ; it is a provincial capital, seat of a university, and an important railway junction. *The Helder*, in North Holland, stands at the entrance of the North Holland Canal, and possesses several naval institutions. In the same province are *Haarlem*, capital of the province, and busy with the cultivation of flower-bulbs, and *Amsterdam*, the largest town, and one of the two chief commercial centres, famous for its Exchange and money market, its shipping, manufactures, diamond-cutting, and for its university and museums. The western parts of the province of South Holland are the most densely

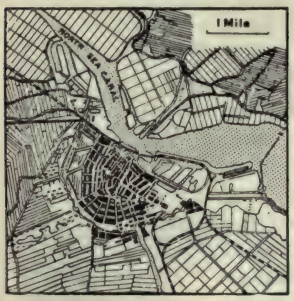

FIG. 112.—*Amsterdam, showing polders in its vicinity.*

peopled districts in the kingdom. There are the towns of *The Hague* (*s' Gravenhage*), the capital of the kingdom and seat of the chief artistic industries; *Delft*, a cheese and butter market, with manufactures of fine pottery, and of spirits; *Dordrecht*, with active river-shipping and trade in timber, corn and wine; *Leiden*, the seat of an ancient university, with a flourishing market, and a still considerable manufacture of cloth and cotton; *Schiedam*, best known for its spirit distilleries producing gin or *Hollands*, but also important as a corn-market; and *Rotterdam*, one of the most famous seaports and commercial centres on the Continent, though the bulk of its commercial activity is in connection with transit trade.

STATISTICS.

	1879.	1889.	1899.
Area of the Netherlands (square miles)	12,728	12,728	12,728
Population of the Netherlands	4,012,693	4,511,415	5,104,137
Density of population per square mile	316	353	401
Population of Amsterdam		399,424	520,602
„ Rotterdam		197,722	332,185
„ The Hague		153,340	212,211
„ Utrecht		83,304	104,194
„ Groningen		56,038	67,563
„ Haarlem		50,500	65,189
„ Arnhem		49,727	57,498

THE DUTCH POSSESSIONS ABOUT 1897.

	Area sq. mls.	Population.
The Netherlands	12,728	5,104,137
Java	50,554	26,125,053
Other Islands of Dutch East Indies[1]	685,846	7,964,947
Dutch Guiana[1]	46,060	67,128
Dutch West Indies	403	51,693
Total	795,591[1]	39,312,958

ANNUAL TRADE OF THE NETHERLANDS (*in pounds sterling*).

	1872–76	1882–86	1892–96
Imports	56,750,000	89,750,000	120,500,000
Exports	43,000,000	68,500,000	98,000,000

STANDARD BOOKS.

"Algemeene Statistiek van Nederland." Leiden. (Published by the Dutch Government Statistical Society), 1870–onwards.
H. Blink. "Tegenwoordige Staat van Nederland." Amsterdam, 1895–96.
R. Schuiling. "Aardrijkskunde van Nederland." Zwolle, 1897.

II.—BELGIUM

By J. du Fief,[2]

Professor of Geography in the Athénée royal of Brussels.

Position and Configuration.—Belgium (*La Belgique*) is situated between 49½° and 51½° N., that is to say, between the parallels of the island of Guernsey and of London. It is bordered on the west by the North Sea which separates it from England, on all other sides there are land frontiers; towards the Netherlands on the north, Germany and the grand duchy of

[1] Estimates. [2] Translated from the French by the Editor

Luxemburg on the east, and France on the south. The short sea-coast, extending for only 42 miles, is washed by a sea so shallow that the depth does not exceed five fathoms until at least five miles from the shore. The shore itself is entirely composed of sand, very low and uniform, but suitable for the establishment of seaside watering-places; it is separated by a line of dunes from the low plain of the interior. From the dunes the land rises gradually towards the south-east, but to the north the surface is absolutely flat throughout the greater part of the provinces of Flanders, Antwerp, and Limburg. In the centre nearly parallel undulations of the ground separate the tributaries of the Schelde; and the surface exceeds 600 feet in elevation at a few points along the left bank of the Sambre and Meuse (Maas). South-east of the line formed by these two rivers the land becomes more broken and picturesque, rising to the high plateau of the Ardennes with a maximum elevation of 2,230 feet, and sinking again on the southern frontier to about 1,000 feet above the sea.

Geology.—Geologically the northern half of Belgium is covered by Quaternary deposits, including the marine and fluvial alluvium of the polders, the sand of the Campine, and the mud of Hesbaye. These are followed by Tertiary formations which extend across the whole breadth of the country as far south as the Sambre and the Meuse, containing the yellow sand of the province of Antwerp, the clay of the Rupel valley, which is of value for brickmaking, and the argillaceous sands and coarse limestones of Mons. Secondary strata are chiefly represented by the Cretaceous rocks which are utilised in the valley of the Haine, fire-clay of a refractory character capable of withstanding a very high temperature, white chalk and a brown phosphatic chalk, and marl and chalk in the valley of the Geer, a tributary of the Meuse. Primary rocks crop out at a few points in Hainaut and Brabant, and cover the greater part of the Ardennes in the provinces of Namur, Liége, and Luxemburg. These strata yield limestones of value both for building purposes and for making lime, sandstones useful for paving, slates, and, most important of all, great deposits of coal which underlie the whole south of Belgium, from west to east, and give rise to rich coal-fields at Mons, Charleroi, and Liége.

Rivers and Canals.—Belgium is traversed from south to north by two great rivers which enter the country from France and pass on into Holland where they reach the North Sea. The *Meuse* (Flemish *Maas*) which traverses the picturesque part of the country in the east, flows through the fine valley in which stand the towns of Dinant, Namur, Huy, Seraing, and Liége. Beyond this it serves as the boundary between Belgium and Holland. It has been canalised as far as Visé, close to the German frontier, to render it fully navigable. Its tributaries on the right are picturesque but unnavigable mountain streams; the lower course of the Ourthe which flows in at Liége has however been canalised. The *Schelde* (French *Escaut*) traverses the low and level country of western Belgium, and the towns of Tournay, Oudenard, Ghent, Termonde, and Antwerp have grown upon its

banks. It is regulated by locks as far as Ghent, below which it flows freely to the sea. The chief right bank tributaries are the Dendre which is canalised, and the Rupel, formed by the junction of the Dyle and the Nethe; and on the left bank the Lys which is canalised. A small coast river, the Yser, which also comes from France, passes Nieuport and flows into the North Sea. Two canals keep up communication between Ghent and the sea, one running to Bruges and Ostend, the other due north to Terneuzen; and a large ship canal is now in construction going direct from Bruges to the sea at Heyst. A great many other canals have been established with the object of developing the system of inland navigation, draining the low country, and irrigating the sandy soil of the Campine.

Climate and Natural Productions.—Belgium enjoys a cool, temperate climate; the mean annual temperature for the whole country is 50° F., but on the high plateau of the Ardennes the mean is only 45°. The prevailing winds are from the south-west and west bringing moisture from the ocean, a fact which accounts for an average number of 195 rainy days in the year.

The most important natural resources are those of the mineral kingdom. Of these coal is the chief, occurring at various depths in the centre of the country, the west and the east, following the courses of the Haine, the Sambre, and the Meuse, where it accounts for the origin of the great industrial centres of Mons, Charleroi, and Liége. Iron ore is extracted principally in the provinces of Namur, Liége, and Luxemburg; zinc in the province of Liége, while stone is quarried largely in Brabant, Hainaut, Namur, and Liége, and slate in Luxemburg. The principal products of agriculture are cereals, flax, hemp, and colza, and the most important fruits are plums and apples. The great Flemish and Brabant horses, and the smaller but stronger Ardennes horse have more than local fame.

People and History.—Two distinct elements can be distinguished in the population of Belgium: a dark race preponderating in the Walloon district which appears to have come from the south at the most remote period, and a fair race descended from the Kelts and Germans. The latter, who were not numerous in the time of Julius Cæsar, have since increased by immigration mainly in the north where Roman influence was weak and the people preserved their Germanic language and character, In the south, however, the Roman influence produced a profound effect. and hence two languages still exist, Flemish (closely akin to Dutch) and French (Walloon), each spoken exclusively by nearly half the population. This explains the fact that almost every place in the country has a Flemish and also a French name. The linguistic dividing line runs approximately from St. Omer in France to Visé on the Meuse.

When Julius Cæsar undertook the conquest of Belgian Gaul in the first century B.C., that region was bounded by the Rhine, the Marne, the Seine, and the sea, and was inhabited by 24 independent tribes. For five centuries it remained under the Romans, until the Franks who had

gradually been invading it, occupied it entirely. Thenceforward the territory of ancient Belgica was thrown into confusion, and it was several times divided between the Merovingians and Carolingians. The first internal divisions were formed during the administration of the Frankish counts, and many localities took their rise round their castles, or round the churches and monasteries. The feudal system was established in the tenth and eleventh centuries when the counties of Flanders, Brabant, Hainaut, Namur, Limburg, and Luxemburg, and the episcopal principality of Liége were established, and these served as the basis of the present provinces. In the thirteenth and fourteenth centuries the municipal system developed, and towns such as Bruges, Ghent, Ypres, Courtrai, Antwerp, and Liége rose to considerable commercial and political power. Most of these principalities were absorbed into the possession of the Dukes of Burgundy (1384–1482), but without forming a real monarchy, and they then passed by inheritance to Charles V. and Philip II. of Spain. Under the last-named prince the Belgian provinces, or the Spanish Netherlands, were ruined by persecutions and religious wars, while the northern provinces, including Holland, separated and formed the republic of the United Provinces in 1570. Attacked by the French under Louis XIV. the Spanish Netherlands were handed over to the Emperors of the House of Austria (1713–95), then from 1795 to 1815 they formed part of the French Republic and Empire. In 1815 they were united with Holland as the Kingdon of the Netherlands, but in 1830 the Belgian provinces objecting to the Dutch Government became at last an independent country, the Kingdom of Belgium.

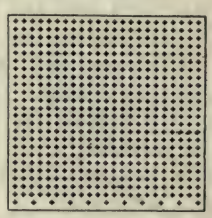

FIG. 113.—*Average population of a square mile of Belgium.*

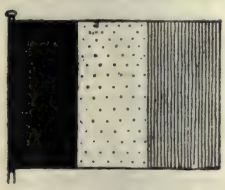

FIG. 114.—*Belgian Flag.*

The Belgians have continued since their independence, as they were in the past, to be distinguished in science and in the arts. The richness of the soil and the aptitude and intelligence of the people have caused the country to rank amongst the greatest producing regions of the Earth, and to support an extremely dense population.

Government.—The form of government is a hereditary constitutional monarchy; the constitution promulgated in 1831 proclaims the equality of all citizens before the law, the complete liberty of religion, of opinions, of forming societies, of speaking any language, of education and of the press. It also provides for two great principles, national sovereignty, and the separation of the legislative, executive and judicial functions. The legislative power is exercised jointly by the King, the Senate, and the Chamber of Representatives. The King is the head of the executive; but he exercises the power through Ministers, none

of his acts taking effect unless countersigned by a Minister, who thereby renders himself responsible. While Belgian soil has often been a battle-ground of European Powers—the classic field of Waterloo where Napoleon was finally crushed in 1815 lies near the centre of the country—it was on its formation as a kingdom declared neutral territory under the guarantee of the chief nations of Europe. Hence it has only to maintain sufficient military forces to preserve its internal security. For administrative purposes the kingdom is divided into nine provinces, West Flanders, East Flanders, Antwerp, Limburg, Brabant, Hainaut, Namur, Liége, and Luxemburg, the provinces being divided into 41 arrondissements which are subdivided into communes. All religions are free, and while the Belgians are almost all Roman Catholics (there are only about 10,000

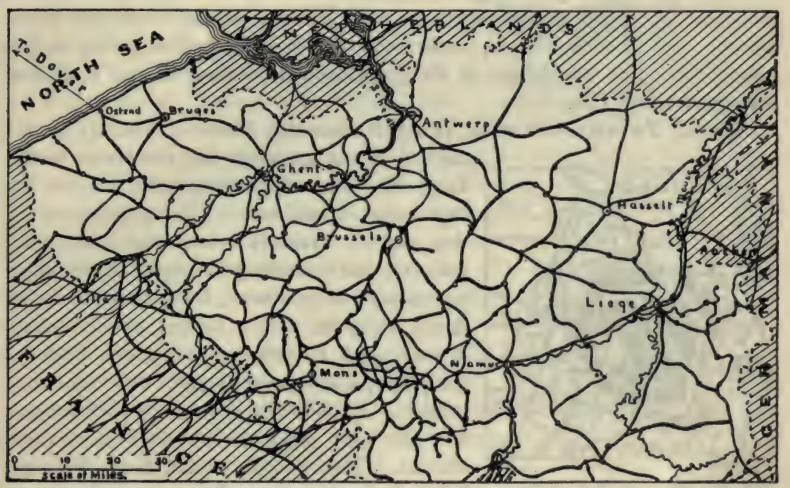

FIG. 115.—*The Belgian Railway System.*

Protestants and 4,000 Jews in the country) the State subsidises Roman Catholic, Protestant, and Jewish ministers.

Industry and Commerce.—Belgium is distinguished by its great industrial and commercial wealth, which is very remarkable when the smallness of the country (which is only one and a half times as large as Wales) is taken into account. Although the majority of the inhabitants are engaged in agriculture, the production of cereals is not sufficient to meet the demand. The minerals of southern Belgium have given rise to metallurgical industries of all kinds, including the manufacture of iron and steel, and the construction of machinery, for which many large establishments have been formed, especially in the neighbourhood of Liége and of Charleroi. The manufacture of firearms for military purposes and for trade has its centre at Liége; cutlery and the manufacture of glass and

crystal are leading industries of the provinces of Hainaut, Namur, and Liége. The manufacture of cloths and woollen stuffs is most developed in the neighbourhood of Verviers, that of cotton yarn and cotton goods at Ghent, and linen in Flanders. Belgium is also renowned for the manufacture of lace. The most important exports, according to value, are coal, grain of all kinds, linen yarn and raw flax, meat, cast-iron, and glass-ware. Most of the trade is done with the nearest countries, France, the United Kingdom, Germany, and the Netherlands.

The means of communication with other countries comprise first of all the steamer lines which connect the port of Antwerp with all the maritime countries in the world, the daily services between Ostend and Dover and between Antwerp and London, and finally a remarkably complete railway system, the longest per square mile of area of any country, which places Belgium in direct communication with France, Switzerland, and Italy, Vienna, and Constantinople, Berlin and St. Petersburg, thus giving to the country the full advantage of its geographical position in the matter of transport trade (Fig. 115).

Chief Towns.—*Brussels* (French *Bruxelle*, Flemish *Brussel*) is the capital of the country, the residence of the king, the seat of government, and of the legislative chambers. The population of the city of Brussels is scarcely more than 200,000; but including the eight surrounding communes (Schaerbeek, Laeken, Molenbeek, Anderlecht, St. Gilles, Ixelles, St. Josse-ten-Noode, and Etterbeek) the whole concentrated population considerably exceeds half a million. Each of these suburban communes has its own separate municipal administration. The Senne which flows through Brussels is not navigable, and water communication is carried on by a canal to the Schelde. Since 1870, great public works have transformed Brussels into a beautiful city, the Senne has been built over to guard against floods, a great central street runs from the northern to the southern stations, and other new thoroughfares have been opened. Amongst the modern buildings the Palais de Justice (law courts), the Post Office, the Exchange, and the National Bank are worthy of any capital, and amongst the ancient buildings the Hôtel de Ville (town hall), dating from the fifteenth century, and the houses of the old trade corporations which surround the Grande Place form a magnificent artistic group not to be rivalled elsewhere. Brussels contains several important picture galleries, valuable museums, an Academy of Sciences, Literature and Arts, a university, and other educational institutions, a Botanic garden and several theatres. It has thus become an intellectual as well as a political

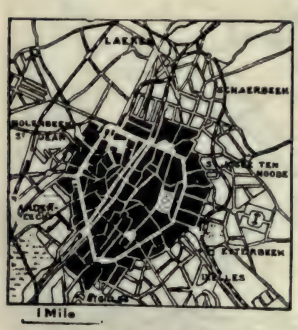

FIG. 116.—*Brussels and its Suburbs.*

centre; the population is rapidly increasing, and many branches of industry have been established, of which the most important are carriage-building, the construction of artistic furniture and lace-making.

Antwerp (French *Anvers*, Flemish *Antwerpen*), situated on the Schelde, 60 miles from the sea, from which it is separated by Dutch territory, is one of the chief commercial ports of Europe; it is also an important fortified place serving as the base for the defence of the country. The old Gothic cathedral containing some of the most celebrated pictures by Rubens, the church of St. James, and the Steen, an old castle of the fifteenth century, are amongst the most interesting of the ancient buildings. There are valuable museums, an Academy of Fine Arts, a musical Conservatoire, and a particularly well-arranged Zoological garden. The port of Antwerp carries on most of the external trade of Belgium, and the town is consequently flourishing. Amongst other branches of industry which have been attracted to the place, sugar refining, distilling, lace-making, and shipbuilding are of great importance. *Liége* (Flemish *Luik*, German *Lüttich*) is a large industrial town on the Meuse surrounded at a distance of about four miles by twelve detached forts, which in conjunction with those around Namur protect the valley of the Meuse (see Fig. 48). The most remarkable of the old buildings is the Palace of the Prince-Bishops of Liége, dating from the sixteenth century, and now occupied by the provincial government. Liége contains, amongst other intellectual institutions, many scientific bodies, an important university, especially well-equipped in the scientific departments, a School of Mines, a School of Arts and Manufactures, a Botanic garden, an observatory, and a Conservatoire of Music. The great industrial prosperity of the town is due to the neighbouring coal mines; its principal manufactures are firearms, the establishments including a Royal Arsenal and many metallurgical and engineering works. Many industrial towns occupy the neighbourhood, including *Seraing*, which contains the great engineering establishment founded in 1817 by the Englishman John Cockerill, and now one of the most important in the world. *Ghent* (Flemish *Gent*, French *Gand*), the principal town in East Flanders, is situated at the confluence of the Schelde and the Lys, the town being built upon a large number of islands in the latter river. A canal goes to Bruges and Ostend, and another larger one to Terneuzen on the lower Schelde. Ghent has played a considerable political part in the history of Flanders, the belfry dating from the fourteenth century, the town hall dating from the fifteenth, and the ruins of the Castle of the Counts preserve the memory of its ancient power. The town is now distinguished for its industrial development, especially the spinning and weaving of linen and cotton, lace-making, and the construction of

FIG. 117.—*Antwerp and its Forts.*

machinery, and also for the cultivation of ornamental plants. It has a university with a school of Civil Engineering, and an Institute of Sciences; there are also a Botanic garden, a Flemish Academy, and a Conservatoire of Music.

While Belgium has developed mainly as an industrial State and now is one of the most densely peopled regions in Europe, it has entered into relations with the outer world, thanks to the foresight and perseverance of King Leopold II. He has become the sovereign of the Congo Free State, and has done much to encourage the intrepid devotion of its explorers and administrators, thereby opening up in central Africa an important market for the trade not only of Belgium but of the world.

STATISTICS.

	1875.	1895.	1900.
Area of Belgium in square miles ..	11,374	11,374	11,374
Population of Belgium	5,403,006	6,410,783	6,693,810
Density of population per square mile	475	563	589

NUMBER SPEAKING CHIEF LANGUAGES IN 1890.

Flemish only.	French only.	French and Flemish.
2,744,271 ..	2,485,072 ..	700,997

POPULATION OF CHIEF TOWNS.

	1875.	1885.	1895.	1900.
Brussels (including suburbs)	385,388	436,843	518,381	561,782
Antwerp	148,814	198,174	262,225	285,600
Liége	117,638	135,371	163,207	173,708
Ghent	131,026	143,241	157,214	160,959
Mechlin	..	47,672	53,772	56,013
Verviers	..	45,521	51,605	52,203
Bruges	..	46,274	49,606	52,867

ANNUAL TRADE (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	52,616,000	60,496,000	65,321,000
Exports	42,516,000	52,072,000	55,464,000

STANDARD BOOKS.

A. Jourdain and L. von Stalle. "Dictionnaire Encyclopédique de Géographie de Belgique." Brussels, 1895 onwards.

The Geographical Societies of Brussels and Antwerp publish many important papers on the regional geography of Belgium.

III.—LUXEMBURG

By the Editor.[1]

Position and Extent.—The Grand Duchy of Luxemburg forms the south-eastern and only remaining independent portion of the once large State of that name. It separates Germany from Belgium, while on its southern side the frontiers of France and Germany meet. Except on the east, where the Moselle and the Sauer, with its affluent the Our, form the border, it has no natural boundaries, and its separate existence is due to the convenience of having a neutral area between powerful neighbours.

Surface and Resources.—The northern part of Luxemburg, known as the Eisling or Œsling, lies on the Palæozoic slate plateau connecting the Ardennes and the Eifel; the soil is poor, and the general aspect sombre and rugged. The southern section known as the "Bon Pays" is a continuation of the Triassic and Jurassic Lorraine plateau, the valleys of which are covered with fertile alluvium. Although the mean altitude of the country is little more than 1,000 feet, and the highest point less than 1,900 feet, the rivers have cut deep and narrow valleys, which give variety and even grandeur to the scenery. The forest of Grünwald is said to be the largest in central Europe, and the south of the country is generally well wooded. There are very rich deposits of iron in the south; lead, antimony, and other ores are found; alabaster of peculiar whiteness and excellent slates are quarried.

People and History.—The people are Teutonic in origin and language, though modified by the admixture of other races. French and German are both official languages; the former is the more generally used, but a dialect of Low German is commonly spoken by the people. In the time of the Romans the territory formed part of *Belgica prima;* under the Franks it was attached to Trèves, and subsequently to Lorraine. In the tenth century it was erected into an immediate fief of the empire, when Siegfried, Count of Ardennes, acquired the old Roman castle of *Luciliburgum*, the site of the modern capital. In the fifteenth century it passed to the Habsburgs, and continued to be a dependency of Austria till 1795, when it became the French department "des Forêts." By the Treaty of Vienna, 1815, Luxemburg was freed from France, erected into a grand duchy, and given to the King of the Netherlands. In 1839, by the Treaty of London, dismemberment was formally effected by the Powers. The larger part then became a Belgian province, and the smaller south-eastern portion was constituted an independent State, which passed from the Dutch Crown on the accession of Queen Wilhelmina. In 1867 the State was neutralised by agreement of the Great Powers and the demolition of the fortifications decreed. The government is a constitutional

[1] Assisted by E. J. Hastings.

hereditary monarchy, with a parliament of one chamber, the members of which are elected by the people for a term of six years.

Agriculture occupies the greater number of the people, and the vintage is large. Iron working is the most important industry; several considerable manufactures are carried on. Luxemburg is a member of the Zollverein, and the trade returns are therefore included with those of Germany. The main railway traversing the country north and south is a link on the through line from Belgium to Switzerland.

Luxemburg (Luciliburgum, Luzilinburch, Lützelburg="little castle") took its name from a castle built by Siegfried on the site of a Roman stronghold, on the Bock, a rock overhanging the opposite bank of the river, and now connected with the town by a stone bridge. The town occupies a very strong position at the confluence of the Petrusse with the Alzette. It consists of two parts, an upper and a lower; the former situated on a rocky plateau rising about 200 feet above the river, with precipitous cliffs on three sides, the only natural approach being from the west. The natural strength of the position caused it to be selected in early times as a strategic point, and the genius of Vauban made it one of the strongest fortresses in Europe. The old fortifications have been converted into fine boulevards and parks.

STATISTICS.

	1880.	1890.	1900.
Area of Luxemburg (square miles) ..	998	998	998
Population of Luxemburg	209,570	211 088	236,543
Density of population per square mile ..	210	214	247
Population of Luxemburg (city).. ..	16,700	18,817	20,928

CHAPTER XV.—FRANCE

I.—PHYSICAL GEOGRAPHY

By Professor A. de Lapparent,
Paris

Structure.—The physical structure of France exhibits, in a very high degree, the union of great structural simplicity with a marked variety of natural features. France may be spoken of as formed of two parts, which join along a straight line of 530 miles, from the mouth of the Bidassoa to the north-eastern corner of the Ardennes near the source of the Sambre. West of that line the land projects in a triangular shape more than 250 miles to the west-north-west, and is surrounded by sea. The larger part, to the east, with the exception of the Mediterranean coast, by which southern France enjoys easy access to the lands of the Far East, is surrounded by a semi-circle of mountains: the Pyrenees in the south, the Alps, Jura, Vosges in the east, the Rhine Highlands and the Ardennes in the north-east. The mean width of the country thus bounded remains over 250 miles.

Thus France possesses natural boundaries throughout: but though encircled, it is not imprisoned; not only because more than half of its outline is made up of the coast of open seas, but because the eastern mountainous girdle is interrupted at some points, such as the gap of the Rhone, between the Alps and Jura; the opening at Belfort, between the Jura and Vosges; that of Lower Alsace, between the Vosges and the Rhine Highlands, and the gorges of the Moselle and of the Meuse, through the same highlands. In the northern corner of France, also, down the slopes of Artois running waters and migrating people are naturally led to the plains of Belgium and Holland, and thence without obstacle to northern Germany and Scandinavia.

Central Plateau.—The chief feature of central France is that a highland stands near its centre—the so-called Central Plateau, consisting almost entirely of Archæan rocks, whose levelled surface is broken in the middle by volcanic accumulations. Thus the old and denuded cones of the Mont Dore and of the Cantal rise to nearly 6,000 feet above sea-level, while the Archæan base of these volcanic structures reveals itself between 3,200 and 3,900 feet. Apart from minor irregularities, the Archæan plateau becomes continuously higher from north-west, where it is 1,500 to 2,000 feet, to south-east. There it ends abruptly, facing the Mediterranean Sea as a great wall, the dissected border of which is called the Cevennes, the highest

summit, located quite on the rim, being the gigantic Mont Lozère, 5,584 feet high. The Cevennes are succeeded in a northerly direction by the mounts of Lyonnais and Beaujolais. While on the whole elliptical in its outline, the Central Plateau is prolonged into two spurs of much the same constitution : the Morvan to the north, and the Montagne Noire to the south, approaching very near to the Pyrenees.

Geological History of the Central Plateau. — The Central Plateau is the very nucleus of France. Early in Palæozoic times it stood as an island, round which sediments were accumulating. Of varying size, according to the oscillations of the crust, it has persisted as a prominent feature through the whole range of geological evolution. Only near the middle of the Tertiary period it was broken by two fractures, from north to south, leading to the formation of Tertiary lakes, the floors of which are now occupied by the plains of the Limagne and Forez, with an elevated Archæan ridge intervening between the two. By the light of the geological and topographical relations which prevail in the Central Plateau we may believe that, near the end of the Tertiary period, it ought to have been reduced to the condition of a peneplain, on the average not much above sea-level, with old rivers meandering on its surface. But when, as a consequence of the Alpine movements, the plateau was tilted as a whole from south-east to north-west, the rivers had to excavate canyons on the site of their old valleys, while volcanic activity asserted itself through the fissures of the now fractured Archæan mass.

FIG. 118.—*The Physical Structure of France.*

Rivers of the Central Plateau.—Thus it is easily understood why, notwithstanding the actual dome-like shape of the country, which is entirely due to late volcanic accumulations, the rivers do not diverge outwards in all directions from a common centre as they flow. Only two directions now prevail : the one south and north, the other east and west.

Both were acquired before the tilting was inaugurated. So the main lines of river-flow are inherited from the time when the flat Archæan mass divided the French region into two parts, one sloping towards a northern sea, the other towards the southern belt of waters. This conclusion is strengthened by another characteristic feature of western France. With the single exception of the Loire, no river comes from the eastern boundaries of the country to the Atlantic. The courses of the Vienne, of the Mayenne, of the Orne, clearly show that there is a marked tendency on the part of the rivers to follow the eastern limit of the Armorican region, which embraces Vendée, Brittany and Cotentin. And, in fact, this region, entirely made up of tilted and upturned Palæozoic sediments, was an island early in Mesozoic times, while between it and the Central Plateau stretched the so-called Strait of Poitou.

The Paris Basin.—The western highland extended far to the west, and was united with British Cornwall; the present state of things being due to long-continued erosion by waves and currents. At the same time, the similar Palæozoic land of the Ardennes became uplifted, while some islands were rising on the site of the Vosges. Thus, this series of emerged lands encircled a nearly closed trough of sedimentation, the Anglo-Parisian Basin, and it has been the work of Mesozoic and Tertiary times, to fill up this trough with various sediments by the disintegration of surrounding regions. When, about the middle of the Tertiary period, this work had been completed, and the Oligocene Sea vanished, there remained in the centre a large lake, the lake of the Beauce, to which rivers flowed chiefly from the north-east, east and south. But the lake was emptied, while its floor was raised in the north-east during Miocene times, and a large trough was opened between Vendée and Brittany, allowing the sea-waves to encroach as far as the vicinity of Blois. Therefore the Loire, formerly a tributary of the lake, abruptly turned west, forcing in the same direction the lower courses of the Cher, Indre, Creuse, and Vienne. Meanwhile the eastern drainage, that of the Moselle and of the Meuse, found an outlet to the north through the more lately elevated highland. But the central and south-eastern parts of the basin were sending their waters directly to the English Channel, the old meandering Seine maintaining its course by a continuous process of cutting through the recently elevated plateau of Normandy.

The Pyrenean Region.—Till the close of the Eocene period, the southern slopes of the Central Plateau were drained into a southern sea, which stretched continuously from the Atlantic to the Mediterranean waters. At that time there was no chain of the Pyrenees, and while the northern basin was submitted to the ever-changing conditions of an enclosed area of sedimentation, in the southern area pelagic influences prevailed, resulting in a quite different and much more uniform type of deposits and fossils. But when the Pyrenees begun to be uplifted, the spur of the Montagne Noire soon was united with the foot of the newly

elevated mountain. Therefore the south-western slope of the Central Plateau, together with the Pyrenees, outlined a large gulf, that of Aquitaine, progressively filled up with marine, brackish, fresh water, and fluvio-glacial deposits. Thus were laid down the large and uniform plains, whose drainage is now concentrated in the Garonne, and which terminate in the great alluvial fan of the Landes.

South-Eastern France.—The south-east of France long remained under the western end of the Alpino-Mediterranean Sea, which, through the Strait of the Cote d'Or, remained in communication with the Paris Basin till the end of the Cretaceous period. Then the land was raised between Morvan and the Vosges, while the present valley of the Saône was depressed and finally became the lake of the Bresse. Meanwhile the Jura and the Western Alps were rising in crowded folds, so that between the outer folds and the linearly lifted border of the Central Plateau, there remained a Rhodanian depression. When Tertiary times came to an end, the Pliocene Sea, which had penetrated through this depression to the neighbourhood of Lyons, left the country, and its bed gave issue to the waters of the Rhone, which had forced their way through the weakest spot between the Jura and the Alps.

Surface and Soils of France.—In accordance with its geological evolution, which has been so complete and continuous as to give rise to representatives of every epoch, the surface of France exhibits an unusual variety of composition. While the Central Plateau, with the exception of the volcanic accumulations, is almost entirely composed of crystalline schists, which give an infertile soil, the old Armorican land is not much better endowed on account of the prevalence of silicious, schistose, and limeless deposits. Nevertheless, the frequent alternation of slates, grits, granites and schists, in long, narrow bands, where the harder rocks project in ridges, makes the country look much less monotonous than the Limousin.

The richest parts of France are to be sought for in the Paris Basin, where the different kinds of soil, though very numerous, have been distributed with great regularity. As the filling up of the basin has, on the whole, progressed from the rim towards the centre, each geological period being marked by peculiar sorts of deposits; as, moreover, the tilting of the lately emerged land took place towards the north-east, east, and south-east, the successive sheets of sediments, formerly buried under one another, are now exposed rising towards the borderlands on the east. Therefore they crop out, one after the other, as concentric girdles. Under the influence of running water, the softer parts in each girdle have been progressively removed on the edges, laying bare the flat surface of the more resisting ground. Now the traveller, going from Paris towards the east or north-east, walks over gently rising plains, each of which ends abruptly in a scarp facing eastward. The upper part of the scarp consists of a harder stratum, while at the

foot the softer layers, the dispersion of which has given rise to the cliff, are trenched. As the development of this structure proceeded *pari passu* with the general uplifting of the old lake-floor, the chief rivers had to cut their way through the mass of the growing cliffs, where they now run on the floor of deep trenches. Every scarp-line constitutes a military front of defence, where the weak points are the entrances of the valleys.

According to the nature of the outcropping sediments, as well as to the more or less advanced rate of dispersion of the projecting tongues of the dissected scarps, the successive girdles are marked by contrasting landscapes, where every sort of land is to be found. Dry and pervious tablelands of compact limestones, with rare but well-fed watercourses (Barrois, Bassigny), alternate many times with low and argillaceous belts, covered with grass and crowded with forests, where plenty of rivulets furrow the ground, but only during the wet season (so-called wet Champagne). When a sandy girdle has been passed, another is met, the earth of which is especially fitted for agricultural purposes (Valois, Vexin, Brie), till a new belt of smooth and bare hills is reached, where the white chalk is to be seen many hundred yards in thickness (Champagne, Picardie).

Thus the numerous "*pays*" of the Paris Basin, strongly contrasting with each other in a cross section of the whole, keep, on the contrary, very constant characters along the direction of the concentric belts. The striking variety which they exhibit is due to the ever-changing conditions of sedimentation which prevailed, during geological times, in such a limited basin, and has been enhanced by the local deformations which the different parts of the country may have independently undergone.

Elevation of France.—The mean height of France averages some 1,000 feet, but more than one-half of the country (that is, the western portion) remains much below 650 feet; there being only small patches of higher ground between Paris and the western seas, in any direction, and only one of these, in the hills of Normandy, stands a little over 1,300 feet.

The chief relief is concentrated in definite lines: (1) in the great and abrupt wall of the *Pyrenees*, the crest of which maintains an elevation between 6,500 and 10,000 feet; (2) in the eastern border of the *Central Plateau;* (3) in the *Western Alps*, highly complicated, and culminating over 13,000 feet in Mont Blanc and Pelvoux; (4) in the parallel and arched ridges of the *Jura*, growing from west to east, till the terminal crest is reached, which directly faces the plains of Switzerland in some summits of 5,500 feet; (5) in the linear crest of the *Vosges*, with peaks from 4,000 to 4,600 feet, and a rather gentle slope towards Lorraine; (6) in the elevated border of the highland of the *Ardennes*, where some points of the levelled peneplain are over 1,300 feet. To which must be added the high tableland of Langres, which at 1,600 feet bridges over the space between Morvan and the Vosges, serving as a south-eastern divide for the Paris Basin, on the very spot where the Jurassic and Cretaceous waters of the same basin mingled in bygone epochs with the waves of Alpine seas.

Climate.—Thanks to such a disposition, the climate of France is a temperate one. As the true mountains of the land are all located on the eastern border, the warm and moist winds from the west, which prevail for the most part, are not stopped by any obstacle before they reach the highest summits. Nevertheless, on account of the neighbourhood of the snowfields of Switzerland and of the continental plains of Germany, the range of the thermometer is rather large, the minimum in some years reaching 13° F. in Paris, while in summer the thermometer rises there to 95° F. in the shade. Sometimes the fall and rise of temperature succeed each other very rapidly.

The great differences of altitude (the highest peak of Europe, Mont Blanc, 15,800 feet, belongs to France), cause every kind of climate to be encountered, from the mouth of the Loire, where frost is almost unknown, to the perpetual snows of the Alps, with the intervening high plateaux of the Cevennes where, during many months, a bitter wind is constantly blowing. The mean annual rainfall for the whole of France amounts to 29½ inches, varying from a minimum of under 19½ inches on the Mediterranean coast from Perpignan to Narbonne, and 19½ to 23½ inches in the region between Le Mans and Reims, to a maximum of 71 inches which is reached on the western corner of the Pyrenees, while on the Mont Dore, Cantal, Morvan and Vosges the rainfall is little over 60 inches. The general distribution of rainfall may be seen on the map of rainfall of Europe in Fig. 53.

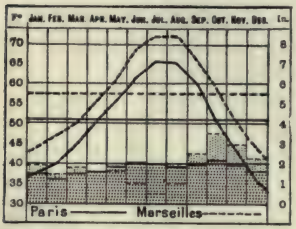

FIG. 119.—*Curves of Mean Monthly Rainfall and Temperature for Paris and Marseilles.*

Mineral Resources.—France has been very poorly endowed with precious metals; iron ore is rather abundant, especially in the state of oolitic layers. The coal-fields, though numerous and scattered, are not sufficient to prevent the necessity of importing from abroad. The country is exceptionally rich in building stones: either products of internal activity, like the granites of Brittany, Normandy, and the Central Plateau; the trachytes and lavas of Auvergne, the porphyries of Esterel, or consolidated sediments of the various geological epochs. For examples of the latter kind we may mention the marbles and roofing slate of the Palæozoic deposits; the Jurassic limestones, mostly oolitic, which are nowadays extensively quarried in Lorraine, Burgundy, Berry, Poitou, Lyonnais, &c.; the fire-clays of the lower Cretaceous formation; the tufaceous chalk of Touraine; the building-stones of the so-called rough limestone, so largely developed in the neighbourhood of Paris; the travertines, plaster-stones, silicious millstones, and gritty paving-stones of the same basin; and the calcareous molasse of Provence.

Volcanic activity has now entirely disappeared from the country, and

since historic times not the slightest eruption has taken place in Auvergne, where the freshness of the craters and volcanic cinder-cones bears testimony that internal fires must have found vent not many centuries before the settlement of the district. But in many parts of France, and always in association with the remnants of extinct vulcanism, or with the manifestation of recent displacements of the crust, there are to be found thermo-mineral springs, successfully used for curative purposes. They occur along the foot of the Pyrenees, round the old eruptive centres of Auvergne, in the Alps, the Vosges, and on the fractured rim of the Morvan.

Flora and Fauna.—As France is everywhere in free communication with adjoining countries, its *fauna* does not essentially differ from that of western and central Europe. But, owing to the want of extensive forest-lands or mountain masses, the range of wild animals is becoming smaller, they being now for the most part artificially protected for sport.

The *flora* is a rich one, on account of the great differences of climate, according to varying altitude and exposure. As the high mountains of the country generally face westward, that is seaward, their slopes enjoy better conditions than they could have done if turned eastward. Thanks to its special situation the south-eastern corner of France, called Provence, is the very garden of the country. There eucalyptus, introduced from Australia, is thriving, as well as the native olive and mulberry. For the remainder of the land oak, beech, lime-tree, yoke-elm, and the various sorts of maple-trees are the prevalent forest species, pine and fir being confined to mountains or to sandy grounds. With the exception of the mountainous parts, peat is to be found only to the north of Paris. The productions of the country are in accordance with the diversity of physical conditions. From the wind-swept downs of the North Sea to the "azure coast," where a vegetation of almost tropical character thrives on the sun-glistening slope of the Southern Alps; from the vineyards of the Medoc or the Côte d'Or to the Alpine woods and pastures below the perpetual snows; from the blooming grasses of Normandy to the desolate plateaux of the Causses every type of vegetation or cultivation is represented.

II.—GENERAL GEOGRAPHY

By Professor L. Raveneau,[1]
Of the "Annales de Géographie," Paris.

People and Language.—The French people, like the English or the German, is made up of several races. In passing from Flanders through Paris and Poitou to the Gironde one can recognise amongst the people the essential features of the Gauls; they are typically fair-haired, tall, and long-headed (dolichocephalic). In the west of France, Vendée, Anjou, Maine,

[1] Translated from the French by the Editor.

and Brittany, and on the Central Plateau in the heart of Cæsar's Celtica, the people have, as a rule, dark hair, and are short and thick-set with broad heads (brachycephalic), representing a much earlier invasion which had evicted the yet more ancient reindeer hunters and the remnants of the Quaternary races. In the Mediterranean region in the south-east and in Aquitaine in the south-west there are traces of the early Ligurian and Iberian peoples. Migrations which are still going on within the country have brought about a general fusion of all these races into one fairly homogeneous general type.

The Gauls, when conquered by the Romans, forgot their own language and adopted Latin, from the popular form of which the new French language gradually formed itself. The language had taken shape by the twelfth century—about the time when France acquired a national existence ; but it appeared in two dialects, the northern or *langue d'oil* (*oil*= *oui*= yes) and the southern or *langue d'oc* (*oc*= *oui*= yes). The dialect of the Ile de France and of Touraine, which was spoken by the kings, gradually superseded the other dialects of the *langue d'oil* in the north, but was not received with the same readiness in the south where some dialects of the *langue d'oc*, Provençal amongst others, are still spoken. The French language is used beyond the political limits of France ; the Walloon dialect is spoken throughout the whole of southern Belgium, and even in a corner of Prussia (Malmedy) ; it is also spoken in part of Lorraine, annexed to Germany in 1871, in several cantons of Switzerland, and in the high valleys of the Italian Alps. On the other hand the Flemish language encroaches upon the northern part of the department of the Nord, and Italian dialects are spoken in part of the Alpes-Maritimes and Corsica. Most of the inhabitants of the Pyrénées-Orientales still speak the Catalan language. At the western end of the Pyrenees the French Basques, who differ anthropologically from the much more numerous Basques of Spain, speak the same Euskarian language, the origin of which baffles the researches of philologists. Finally, in lower Brittany the Keltic language in four dialects is used by the peasants living to the west of a line drawn from the river Vilaine to Chatelaudren.

Territorial Growth.—Neither community of race nor of language would have sufficed to form the nation ; two other forces were necessary, a line of kings working for centuries to build up the provinces into one country, and a devoted people supporting their royal leaders without stint of money or life. At the time when the Duke of Normandy conquered England in 1066 his suzerain, the King of France, only possessed in his own right Valois, Ile de France and Orléanais. In the following century, as by the turn of a tide, England occupied the whole Atlantic coast of France, and for a time the French king was nothing more than King of Bourges. Jeanne d'Arc and Charles VII. recovered the territory, but Calais, the key of the Channel, was held by the English for another century. Interrupted by the chivalrous epic of the expeditions into Italy and by the sanguinary

interlude of the religious wars, the policy of territorial consolidation was revived by Henry IV. Richelieu and Mazarin added to France the "four nations": Roussillon, Piémont (Pignerol), Alsace and Artois in 1648 to 1659. Under the personal reign of Louis XIV. the frontier reached the Alps at Barcelonnette in 1713 (the possessions beyond the Alps had been given up in 1697); it had already advanced towards Switzerland, incorporating Franche Comté in 1678, and towards the Spanish Netherlands, encroaching on Flanders in 1668. Louis XV. acquired an *enclave*, Lorraine, in 1766, and annexed Corsica in 1768. The Treaty of 1814 left to France the *enclaves* which had been suppressed during the Revolution (Comtat Venaissin, Mühlhausen, Montbéliard), but required the restoration of the fruits of Napoleon's conquests in Belgium, Holland, Germany (Hamburg), Switzerland (Geneva), and Italy (Rome). France gave up Savoy and Nice, gained during the Republic, and only touched the Rhine through Alsace. The Treaty of 1815 broke into the northern frontier by the loss of Philippeville, Marienburg, and Landau. As a reward for the part taken by France in securing the unity of Italy Napoleon III. recovered the departments of Savoy and Nice, the inhabitants of which ratified their change of nationality by a popular vote. The war with Germany and the Treaty of Frankfort in 1871 threw back the French frontier to the crest of the Vosges, and Alsace and Lorraine were incorporated without the consultation of the inhabitants as an Imperial Territory of the German Empire.

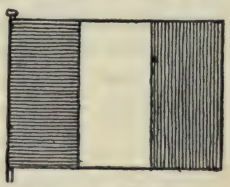

FIG. 120.—*The French Flag.*

Government.—Since 1871 in fact, and since 1875 by law, the form of government in France has been that of a constitutional republic. The *Chamber of Deputies*, elected directly by universal male suffrage, and the *Senate* nominated by a special electorate, exercise legislative powers, and united in *Congress* they elect the President of the Republic who exercises the executive authority through responsible Ministers. The democratic spirit of the country assures to all free education and the right of voting, and imposes in return compulsory personal military service. All religions are tolerated and the State allows an annual subsidy to Roman Catholic, Protestant, and Jewish ministers. The majority of the people are Roman Catholics.

Administrative Divisions.—In 1790 the National Assembly substituted for the old French provinces 83 departments. This number was raised to 89 by the creation of Vaucluse, the splitting of Rhône-et-Loire, the formation of Tarn-et-Garonne, the annexation of the two departments of Savoy and the Alpes-Maritimes; and since 1871 it has been reduced to 86 by the cession of the whole Bas-Rhin, of the Moselle, with the exception of the arrondissement of Briey (which was united to Meurthe to form Meurthe-et-Moselle) and of Haut-Rhin with the exception of the territory of Belfort. At the head of each *department* Napoleon placed a Prefect as

an agent of the central authority, and at the head of the *arrondissement* a sub-prefect. Each of the 36,000 *communes*, except Paris, is administered by an elected mayor.

A larger, more elastic, and more geographical division is tending gradually to be superimposed upon the departments. This is the *Region*, represented by the ecclesiastical division which the National Assembly had adapted to the departments, and also used by the Courts of Appeal and the Academies instituted by Napoleon, by the Army Corps (for which there are 19 regions including Algeria, created in 1872) and finally by the Universities, to which the State has recently restored liberty and vitality.

Movements of the Population.—The population increases very slowly; from 1872 to 1901 the total increase was not so much as 3,000,000, while in the same period the population of Germany had increased by more than 18,000,000. While the French Canadians continue to increase perhaps more rapidly than any other civilised people, the birth-rate in France itself has fallen lower than that of any other country in Europe. The increase, such as it is, results not from the general growth of the population but from the exceptional increase in a few departments. From 1846 to 1896 the five departments of Seine, Nord, Rhône, Loire, and Bouches-du-Rhône, showed an increase greater than the average for France; a large number of departments have remained stationary, while those of Normandy and of the basin of the Garonne show a marked diminution. Different parts of France exhibit important movements of the population in the form of temporary removals, such as the exodus of people from the Central Plateau or the Alps to Paris, Lyons and Marseilles for work with the prospect of returning, and also of permanent displacement. The population of the department of the Seine in 1896 was made up of people coming from other parts of the country to the extent of 56 per cent. The rural population, that is to say people living in communes which do not contain an aggregation of more than 2,000 inhabitants, is diminishing, while the urban population increases; thus the rural population amounted to 75 per cent. of the whole in 1846, but only to 61 per cent. in 1896. The population of 34,000 purely rural communes is diminishing to the profit of from 400 to 500 towns; the number of towns with a population exceeding 30,000 has increased from 54 in 1886 to 69 in 1901. These currents of internal migration cross and at some points mix with those of immigration. Between 1851 and 1891 the number of foreigners living in France increased by 200 per cent., and in the latter year exceeded a million. Foreigners are very numerous in the large towns and in the departments near the frontiers, forming, for instance, one quarter of the population of the arrondissement of Lille, and concentrating in two places in the interior, at Ile de France

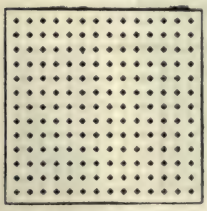

FIG. 121.—*Average population of a square mile of France.*

and Adour-Garonne. A law passed in 1889 facilitates naturalisation, and provides that the children born in France of foreign parents who were themselves born in the country are by birth French citizens.

There is at present but little emigration from France, and figures can hardly be given (say about 10,000 per annum). The people of the Basses-Alpes emigrate to Mexico where they are known as Barcelonnettes, the Basques habitually make their way to the Plata States, and people from the Mediterranean coasts have established themselves as vine-growers in Algeria. It is estimated that half a million French citizens live in foreign countries.

Agriculture.—Half the total surface of France is made up of arable land, and almost half the working population (46 per cent.) is occupied in agriculture. Peasant proprietors are very numerous and cultivate their land with tireless assiduity. Agricultural societies are gradually extending the use of fertilising agents and the employment of scientific methods. Although the greater part of the arable land (58 per cent.) is devoted to the growth of cereals, and produces annually from 300 to 330 million bushels of wheat (nearly 19 bushels per acre on the average), the French, being great eaters of white bread, require, when the harvest is poor, to import wheat from the United States and Russia. Maize, for which a moist and warm climate is necessary, grows mainly in the basin of Aquitaine; barley associated with hops supplies many breweries in the north and east, and beetroot, cultivated on a large scale in the plains of Flanders, Picardy, Brie, Beauce and Limagne, is used for the production of alcohol in distilleries attached to the farms, or for the manufacture of sugar in sugar-mills. While the work on large farms tends more and more to assume an industrial character, the market gardens of Provence, Agenais, and Anjou supply fruit to the markets of Paris, and the early produce of Brittany (the Golden Belt) is also largely exported to London. Horse and cattle breeding is an important branch of farming on the coast of Flanders, the pastures of the Pays d'Auge, the meadows of Perche, Bocage of Vendée, and the "prés d'embouche" of Nivernais and Charolais. Sheep are largely kept on the dry pastures of Champagne Pouilleuse and of the Causses, those of Crau are fed in summer on the mountain pastures of the Alps and of the Cevennes, as is the custom in Spain and Italy. Dairy-farming and cheese-making prosper in Boulonnais, Bray (Neufchatel), Lower Normandy (Camembert), Brittany (Prévalaye), the Central Plateau (Roquefort) and the Jura.

The vine was formerly cultivated as far north as the shores of the Channel, and in Champagne it is still grown north of lat. 49°, but otherwise its real importance is now confined to the valleys of the Saône (Côte d'Or and Mâconnais) and the Rhone, to Lower Languedoc and Bordelais, whence there has been a regular export of wine to England since the Hundred Years' War. The production of wine in France is greater than that in Italy or Spain, although it has been very seriously affected by the phylloxera pest; a production of 1,850 million gallons in 1875 having been

reduced to 550 million gallons in 1887 ; but the vineyards have now been restored by the introduction of American plants, and in 1900 the production of wine in France exceeded 1,500 million gallons. The vine is associated in the valley of the Rhone with the mulberry, employed for rearing silk-worms, in Provence with the olive, and in the neighbourhood of Nice with the orange.

Industry.—Mineral and textile industries support one quarter of the population, but France is far from being so favoured as Great Britain in this respect ; its output of 33 million tons of coal (in 1900) is insufficient, and an annual import of from 12 to 15 million tons from England, Belgium and Germany is required. The numerous coal-fields include the group of the Nord and the Pas-de-Calais, which yield 60 per cent. of the total production, and those of the Loire (St. Etienne), Burgundy and Nivernais (Le Creusot), Gard (Alais), Tarn and Aveyron (Aubin, Carmaux), and Bourbonnais (Commentry). Altogether 140,000 workmen are employed in coal mines. The average price of the coal at the pit mouth varies from 7s. 6d. per ton in the northern coal-fields to 11s. per ton in the Loire field ; but on account of the cost of transport the price as sold in the department of Haute-Vienne is increased to 29s. per ton, a fact which acts prejudicially on the manufactures of districts far from the coal-fields. The coal production of France is shown graphically in Fig. 70. Iron ore is largely extracted from the oolitic rocks at Nancy and Briey, the department of Meurthe-et-Moselle yielding nine-tenths of the iron raised in France, and in the Oolite of Champagne (Vassy) ; some iron is also produced in Franche-Comté and the Pyrenees. The production of cast-iron, wrought-iron and steel exceeded five million tons in 1900, most of it being produced in Meurthe-et-Moselle, at Le Creusot, the rival of Essen in Germany and Seraing in Belgium, and at Fives-Lille. Building materials and other mineral products are obtained by quarrying. The more important are marble from the Pyrenees, building stones from Lorraine, Burgundy, Berry, and Bordelais, mill-stones and hydraulic cement from Ardeche, plaster from the neighbourhood of Paris, as well as phosphate of lime (Somme and Pas-de-Calais), and marl.

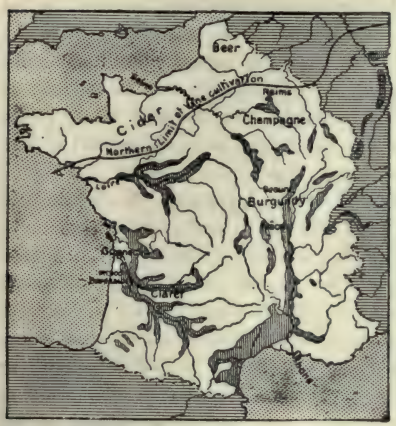

FIG. 122.—*The range of the vine in France—shown by vertical shading.*

Textile industries flourish most in the neighbourhood of coal-fields and near the supply of raw materials. With the coal-field of the Nord the spinning and weaving of linen, hemp, jute, and cotton are closely associated.

On the other coal-fields, St. Etienne manufactures ribbons, Roanne cotton cloth, and Lyons is the queen of the silk trade. The old Norman weaving industry is now represented by the cloths of Elbeuf and Louviers, and the cottons of Rouen. Some industries have grouped themselves near waterfalls on the slopes of the Vosges (cotton-weaving); in the valley of the Isère, where there are paper-works and glove factories at Grenoble and Voiron; along the banks of large rivers of pure water, such as the Charente with the gun-factory of Ruelle and the paper-works of Angoulême, and of the Essonnes with the paper-works and flour-mills of Essonnes and Corbeil. Historical reasons and industrial tradition have as much to do as geographical conditions in explaining the woollen industries of Champagne (Reims), and Languedoc (Mazamet), the cloths of Sedan, the porcelain of Sèvres and Limoges, the carpets of Gobelins, Beauvais, and Aubusson, the mirrors of St. Gobain, and the crystal of Baccarat.

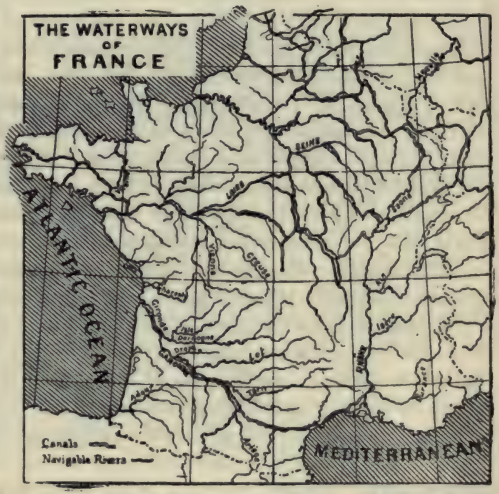

FIG. 123.—*The Rivers and Canals of France.*

Means of Communication.—Transport and trade furnish a livelihood to 13 per cent. of the population. The means of communication comprise a close network of roads which are regarded with just pride; these comprise the national high roads, the magnificent engineering of which is a heritage from ancient France, departmental roads and parish roads. The expansion of railways has thrown undeserved discredit on the old roads which, after all, are their natural tributaries. Steam tramways and motor cars, not to speak of bicycles, have, however, led to an increase of road traffic, which produces its effect on the national statistics.

Waterways.—The rivers, whose harmonious arrangement had attracted the attention of Strabo, have been regulated and deepened so as to render their current more uniform and permanent. A depth of nearly 7 feet now prevails in more than a quarter of the rivers used for navigation. Engineers have made projects for improving the sluggish and capricious Loire, and they have overcome in part the rapid current of the Rhone, for although the ascent of that river is always difficult it is descended by numerous vessels. In the north of France the triumph of the engineers is complete.

Works carried on between 1878 and 1886 have established a depth of water exceeding 10 feet on the Seine between Paris and Rouen, and the traffic on that section has doubled in less than 20 years. Paris has become the principal port of France, and although, strictly speaking, it cannot be termed a seaport, it yet maintains regular direct communication with such places as Nantes and London. The natural waterways are supplemented by an excellent system of canals, the best of which are those of the north and east of France, but one-half of the canals in the country have a depth exceeding 6½ feet. Water transport has been rendered more and more economical by the introduction of steam traction, and of such modern developments as electric power in the tunnel of the Burgundy canal, and hydraulic lifts at Fontinettes on the Neuffossé. Forty-two per cent. of the mineral fuel for Paris is brought into the city by water. The system is of particular service in facilitating the exchange of heavy and bulky products between the north and east by the canals which join the Oise to the Marne and the Rhine, coal coming from the north, cast-iron and iron-ore from the east. The recently constructed Eastern Canal, and the canals joining the Marne to the Saône and the Doubs, which are on the point of completion, unite Franche-Comté to Champagne and Flanders. The canal of Briare, the first canal with level reaches which was constructed in France, and the Central Canal with their branches form important arteries of traffic between Paris, Montluçon, Roanne, and Châlon-sur-Saône.

Railways.—The railway system converges on Paris even more conspicuously than do the roads and canals, and each company's lines radiating from Paris serves a separate sector of France ; the cross lines as a rule have only moderate traffic except the sections from Dunkirk to Nancy, from Amiens to Châlons and Chaumont, from Caen to Le Mans by Alençon, from Tours to Vierzon and Châlon-sur-Saône, and from Bordeaux to Cette.

The *Northern Railway* (*Chemin de Fer du Nord*), with a total extent of 2,300 miles, covers a small territory with a close network ; its traffic is proportionally greater than that of the other lines as it serves a very fertile, populous, and industrial region. On this system Lille is 153 miles, or 3 hours, from Paris ; Brussels 193 miles, or 4½ hours ; Berlin 665 miles, or 18 hours, and the distance of 1,680 miles to St. Petersburg is covered in 48 hours by the Northern Express. Only 7 hours are required for the journey from Paris to London by Calais and Dover, or by Boulogne and Folkestone, and the Northern Railway is the link connecting Great Britain, by the shortest sea-passage, through Paris with all parts of Europe. Special through trains connect Calais with Basel in 14 hours *viâ* Châlons-Chaumont ; with Nice *viâ* Paris in 20 hours, and with Brindisi, the port of the Far Eastern mails, *viâ* Paris and Modane in 40 hours. The section of the Northern Railway between Amiens and Paris is one of the busiest in Europe, and some of the international trains travel over it at the remarkably high average rate of 56 miles an hour.

The Eastern Railway (*Chemin de Fer de l'Est*), has a system of 2,900 miles

of line. By Nancy, it connects with the south of Germany and Austria (Vienna 870 miles in 22 hours). The Oriental Express runs from Paris to Constantinople, a distance of 1,900 miles in 62 hours. Another line by Chaumont and Belfort communicates with Switzerland, reaching Basel in nine hours, and Milan by the St. Gothard tunnel in 18 hours from Paris.

The Paris Lyons and Mediterranean Railway (*Chemin de Fer Paris-Lyon-Mediterranée*, or shortly *P.-L.-M.*) is the largest system in France, serving the greatest area, and with a total length of 5,400 miles of line. The importance of this great central artery of trade, which follows the old natural route formed by the valleys of the Yonne, the Saône, and the Rhone, is explained by the diversity of the districts which it unites, and the variety of the productions which it transports; the busiest section of the line is that between Lyons and the sea. The principal line unites Paris and Marseilles, a distance of 537 miles, traversed in 12 hours; it passes through Dijon, Lyons, and Tarascon, the junction for Nîmes, whence trains run on the lines of the Southern Company to Cette, and thus to Barcelona, 754 miles from Paris, reached in 23 hours. This system sends two lines to Switzerland; one from Dijon by Pontarlier to Lausanne, and the other from Mâcon to Geneva. Two lines also go to Italy; one by Mâcon, Modane, and the Fréjus (Mt. Cenis) tunnel to Turin and on to Rome, a distance of 910 miles, traversed in 29 hours from Paris. The second line runs along the coast of the Mediterranean from Marseilles.

FIG. 124.—*The French Railway System. The breadth of the lines indicates the volume of traffic.*

The Paris-Orleans Railway (*Chemin de fer Paris-Orléans*) and the *Southern Railway* (*Chemin de fer du Midi*) meet at several places, and, unlike most of the French lines, one occasionally penetrates the territory of the other. They connect the Spanish railway system with the French by one line round the eastern, and another round the western extremity of the Pyrenees. The most important section of this system is that through Orléans

and Tours to Bordeaux, 363 miles, traversed in 7 hours. This journey can also be made by the *State Railway* (*Chemin de fer de l'Etat*), *viâ* Chartres and Niort. The Southern Express from Paris by Bordeaux reaches Madrid, a distance of 900 miles, in 27 hours. Another line connects Paris with Limoges and Toulouse. The lines of the Orléans company have a total length of 4,300 miles, those of the Southern company 2,100 miles, and those of the State Railway 1,750 miles. The Neussargues-Béziers line traverses the Central Plateau by a series of great engineering works including the viaduct of Garabit. The departments of the Charentes and Vendée are served by the State Railway, while the districts of Anjou and southern Brittany have the advantage of the rivalry between the Orléans and the Western companies.

The Western Railway (*Chemin de fer de l'Ouest*, 3,500 miles), runs from Paris to Brest, a distance of 387 miles, accomplished in 11 hours; but this line is only important as far as Rennes. Other lines run to Granville and Cherbourg, but the heaviest traffic of the system is carried on in the neighbourhood of Paris, and on the great artery of trade running from Paris to Rouen, and terminating at Havre (141 miles, covered in 3 hours) and Dieppe, the latter on the route to London *viâ* Newhaven.

Ocean Routes and Commerce.—The railways bring Paris into touch with the great lines of ocean steamers. The *Messageries Maritimes* unite Marseilles with the ports of the Mediterranean, and through the Suez Canal with Madagascar, Indo-China, Japan, Australia, and New Caledonia (in 37 days). From Bordeaux steamers of this line touch at Lisbon and go on to Dakar in West Africa, or to Rio de Janeiro in 16 days, and to Buenos Aires in 21 days. The *Compagnie Générale Transatlantique* runs from Marseilles to Algiers in 24 hours, from St. Nazaire to Colon and Vera Cruz, and from Havre to New York (7 days).

The mercantile marine of France is declining; not from the want of sailors, for the fisheries on the coast and in distant seas rear a vigorous race on the Mediterranean, the Atlantic, and the Channel; but because the seaports have not been improved in an adequate manner, and on account of the difficulty which vessels landing large cargoes find in obtaining an adequate return freight. France, in fact, imports more than she exports, just as she receives more foreigners than she sends out emigrants. The *imports* as a rule consist of raw materials for manufactures which are in general bulky: coal from the United Kingdom, copper from Chile, flax and hemp from Russia, jute from India, cotton from the United States, raw silk from the Levant and the Far East, wool and hides from the Cape, Australia and the Plata, wood from Norway and from America. The principal food-products imported are grain from Russia and the United States, and coffee from Brazil. The *exports* include agricultural produce such as wine, fruit, butter and cheese, but consist mainly of manufactured articles of small weight and high price, too expensive indeed for customers who in all countries are more and more demanding cheaper and

plainer goods ; they consist mainly of fine woollen cloth, silk, cotton, and the innumerable artistic manufactures known as *articles de Paris*. The fluctuations of the total trade of France are shown graphically in Fig. 71.

Regions and Towns of the North. — France possesses three important seaports in the North Sea and on the Channel. *Dunkirk* presents its deep and commodious harbour to ships from the north, between a flat shore bordered by dunes and the watery plain of the Wateringues. Near a repellant line of chalk cliffs the triple town of *Calais* stretches along the shore, comprising the port with its immense passenger traffic, the fortified town, and the industrial St. Pierre-les-Calais. *Boulogne* lies unobtrusively on a little estuary amongst meadows. The relief of the country behind these seaports is as undecided as the political frontier which was gained at Lens and saved at Denain. The character of the populous towns of the north still exhibits the old Spanish pride softened by the wider municipal spirit of Flanders. *Lille* has been, thanks to Vauban, the principal fortress of the north, and it is now the first post in the great line of frontier fortifications which, with some gaps protected by the second line of defence, stretches as far as Belfort (see Fig. 48). The Black Country of Belgium seems to be prolonged underground to the mining district of Anzin and Lens, while the Flemish textile industry, which preceded that of England and France, has revived again in the sister-towns of *Tourcoing* and *Roubaix* which are now united by the growing suburbs of Lille.

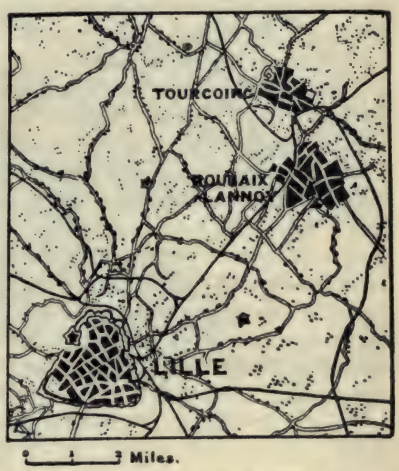

FIG. 125.—*The manufacturing district of Lille.*

The towns of the Somme share the intense industrial activity of French Flanders, especially *Amiens*, where the full river flows slowly through a peaty valley at the base of long ridges denuded of chalk, and *St. Quentin*, the capital of the district of Vermandois, where a canal unites the Somme and the Oise.

One of the outlying hills of the old province of Ile de France is crowned by the citadel of *Laon*. Another, the Montagne de Reims, displays a rich covering of vineyards on its slopes, and conceals in the cellars beneath its surface millions of bottles of champagne. The town of *Reims*, where Clovis was baptized and the kings of France consecrated, covers with its factories the beginning of the plain of Champagne. Champagne Pouilleuse has two centres, *Châlons-sur-Marne* with its great camp, and *Troyes*, the scene of one of the most ancient fairs in northern France. Further east,

beyond the mountain ridge of the Côtes de Meuse, are the two strongly fortified episcopal cities *Verdun* and *Toul*. A furrow in the plateau of Lorraine is marked out by the blast furnaces near *Nancy*, a city proud of its squares and of its monuments, the heritage of Stanislas.

Paris, situated in the hollow of the Paris Basin 85 feet above sea-level, is a centre towards which flow not only the rivers converging to the Seine but the commodities of the surrounding countries and the people of France and of the world. Originating on an island in the Seine, and at first, like London, a resting place for sailors, it has spread over the higher ground of both banks, until now it is bounded on the south, near Villejuif, by the lower slopes of an agricultural plateau, and is expanding in suburbs of villas towards *Vincennes*, and as a town of factories to the north including *St. Ouen* and *St. Denis*. On the west there are extensive woods, now diver-

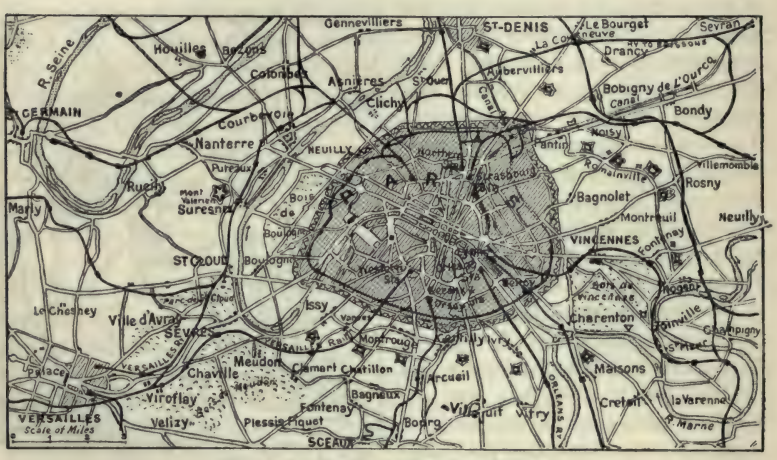

FIG. 126.—*Paris, showing Fortifications.*

sified by numerous active towns including *Neuilly*, *Boulogne*, and *Sèvres*; in the centre of these forests Louis XIV. created *Versailles*, with its beautiful gardens and artificial lakes. Paris illustrates the rich past of France in its monuments, and reflects the varied aspects of the country in the daily life of its people. Its beauty, made up of contrasts softened by time, makes many a Frenchman forget his province and attracts many a foreigner from his native land.

Normandy.—The lower Seine, become a tidal river, bears on one of its wide curves the ancient city of *Rouen*, the spires of its old churches and the masts of its shipping standing out against the sky; while cotton factories dot the little valleys cut deeply into the plateau of the Pays de Caux or Upper Normandy, the surface of which is covered with well-wooded farms. The third port of the Seine, *Havre*, created by Francis I., has killed Harfleur and strangled the trade of Honfleur, although it has not

detracted from the ancient maritime fame of *Dieppe*. Havre does a large trade in coffee from Brazil and wheat from the United States, and great flour mills have been established in the town. The capital of Lower Normandy is the market town and seaport of *Caen* on the Orne. The stones from its famous quarries were used in the construction of some of the Norman buildings in England, and stone quarrying is still an important local industry. The Campagne de Caen is prolonged beyond *Alençon* by the Campagne Mancelle, adapted for the growth of cereals and the rearing of poultry, by which the town of *Le Mans* in particular prospers. The fortified port of *Cherbourg* stands at the extremity of the peninsula of Cotentin, the geology of which marks it as Breton rather than Norman; the breakwater, which has made it an excellent naval harbour, required a century and a half for its completion.

Brittany.—Brittany, a land of granite and schists, appears infertile in the interior, the poorly cultivated ground being broken up by woods of oak and moorlands. The coast, on the contrary, bathed by the warm Atlantic water, is richly cultivated, and has also important sardine fisheries. The indented coast of the peninsula of Brittany abounds in harbours including *St. Malo*, an old haunt of corsairs; *Morlaix*, which exports early vegetables to England; *Brest*, a naval port on a great roadstead, the entrance to which, however, is rendered difficult of access by reefs and frequent fogs; *Lorient*, another naval port, mainly of value as a dockyard where French men-of-war are built and repaired; and *Nantes*, on the Loire, one of the two capitals of Brittany. The people of Nantes have endeavoured, by the construction of a direct outlet to the sea (the Loire Ship Canal, opened in 1892), to recover their ancient prosperity, formerly fostered by the West Indian trade, which has been seriously menaced by the competition of the rising port of *St. Nazaire* at the mouth of the river. The other capital is the old parliamentary town of *Rennes* lying in a Tertiary basin traversed by the railway and canal from St. Malo to *Redon* along a track which has always been an important north and south road.

The Loire Basin and Central Plateau.—*Angers*, near the junction of the Maine and the Loire, is a centre for the surrounding orchards and slate quarries. *Tours*, at a point where several fertile vine-growing valleys open out on the Loire, is surrounded by parks and fine country houses. *Orléans*, on the most northerly curve of the Loire, stands between the district of Beauce on the north, which has always been one of the granaries of France, and that of Sologne, formerly a pestilential plain but now greatly improved. From its commanding position Orléans played a considerable part in the Hundred Years' War and in the war of 1870–71; its trade, formerly very active, suffers from the loss of the boat traffic on the river. *Bourges*, situated almost in the geometrical centre of France, is the principal market town of the old province of Berry, the country watered by the tributaries of the Loire which flow northwards from the Central Plateau. *Clermont-Ferrand*, high on the Central Plateau, is the

successor of the old Gaulish town of Gergovia, and stands between the range of the Puys and the Limagne, a region of old lake beds now bearing rich harvests; *Royat*, which almost touches it, and *Vichy*, not very far to the north, are famous for their mineral waters. *Limoges* stands at the meeting-place of several important routes which skirt the Central Plateau, and although far from the sea and far from coal mines, it is a prosperous industrial town on account of kaolin, the material for the manufacture of the porcelain which it produces, abounding in its neighbourhood. *Poitiers*, an old ecclesiastical and feudal town, commands the uniform plateau drained by the western rivers flowing from the Central Plateau to the Loire and uniting the Paris Basin with the south-west. On account of this position it has been the scene of many decisive battles.

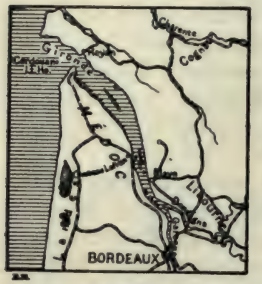

FIG. 127.—*The Gironde Estuary.*

The South-West.—*La Rochelle*, with its new suburb *La Pallice*, has not yet recovered the importance which it formerly held as the Protestant capital. *Rochefort*, on the plain of Cognac, is an important naval harbour in spite of the tendency of the river Charente, on which it stands, to become blocked by sand. *Bordeaux*, founded by the Romans and long held by the English, stands on the Garonne in the centre of an ancient wine-growing district, which has retained its prosperity because it has in great measure escaped the ravages of the phylloxera. With its outport, *Pauillac*, on the Gironde, it carries on active trade with Great Britain, West Africa, and South America. The splendour of its monuments attests the antiquity of its origin and the power of its commercial traditions. *Pau*, the capital of the old province of Béarn and the birthplace of Henri IV., in the midst of a wine-growing region, is the most important of the Pyrenean towns, some of which, like *Cauterets* and *Bagnères-de-Luchon*, are much frequented watering-places on account of their thermal springs. *Toulouse*, half way between Bordeaux and Cette, on the most easterly curve of the Garonne, is in the centre of rich grain-growing plains, whence there is easy access to the Central Plateau and to Languedoc.

FIG. 128.—*Lyons.*

The South-East.—In the basin of the Saône *Dijon*, the capital of the old province of Burgundy, stands at the junction of the routes from the west and north by the valleys of the Yonne and the Marne and at the commencement of the vineyards of the Côte-d'Or. *Besançon*, encircled by a curve of the Doubs, is the key of the Jura, the plateaux of which are

covered with pasturage while the valleys shelter numerous small industrial towns largely engaged in watch-making. *Lyons* is ranged upon the lower slopes of the eastern wall of the Central Plateau at the junction of the Saône and the Rhone, where the lake-dotted plateau of the Dombes meets the mountainous Dauphiné. It is the second town in France for population, for industrial activity, and the enterprise of its capitalists ; in the silk trade it is unsurpassed. The neighbouring town of *St. Etienne* combines mining and the making of fire-arms with the manufacture of ribbons. The whole valley of the Rhone and the plain of Languedoc are dotted with old Roman towns, forming regular stages on the first great road built in Gaul : of these are *Vienne, Orange, Avignon,* the papal city ; *Beaucaire,* the glory of the south in the Middle Ages ; *Nîmes,* which still retains many fine memorials of the past ; and the old commercial and university town of *Montpellier,* still celebrated for its Medical School. *Cette* was founded in the seventeenth century as a seaport to replace Narbonne, which had become an inland town by the silting up of the flat shore. *Marseilles,* on the edge of the old Roman province of Provence, of which *Aix* has long been the centre, has been successively Greek, Roman, Provençal, and French. Beside the old harbour, the plan of which has become classic in the whole Mediterranean, the docks of La Joliette are thronged with large vessels trading with the East, not only French liners but the steamers of British companies which make it the port for embarking passengers for India and Australia. *Toulon* conceals in the depths of its safe harbour the vessels of war of the French Mediterranean fleet, and the naval shipbuilding yards. Further east the Azure Coast takes on an Italian splendour at *Cannes* and *Nice,* the favourite winter resort of the sovereigns of Europe and of a considerable portion of their subjects.

FIG. 129.—*Marseilles.*

Conclusion.—Although France is a remarkably homogeneous country it yet presents a great variety of soil, climate, and productions. This diversity is reflected in the national character, typically lively and frank, but, notwithstanding appearances, lacking neither in energy nor earnestness. France, toiling under the burden of a heavy history, has been distanced by younger and better equipped nations in some branches of human activity, but it has never ceased to maintain its old reputation for bright intelligence, sociability and generous hospitality.

STATISTICS.

	1886.	1896.	1901.
Area of France in sq. miles [1] ..	207,127	207,127	207,127
Population (total)	38,219,000	38,518,000	39,031,000
French and naturalised ..	37,092,000	37,490,000	37,993,000
Foreigners	1,126,000	1,027,000	1,037,000
Density of population per sq. mile	184·5	186	188

[1] This value, calculated by the Geographical Service of the Army, is preferable to that of 204,210 square miles, the area calculated by the Survey Department (*Cadastre*).

THE FOREIGN POPULATION OF FRANCE.

	Belgians.	Italians.	Germans.	Swiss.	Spaniards.	British subjects.
1891 ..	465,000	286,000	83,000	83,000	77,000	39,000
1896 ..	395,000	292,000	91,000	75,000	77,000	36,000

POPULATION OF CHIEF TOWNS.

	1886.	1896.	1901.		1886.	1896.	1901.
Paris ..	2,344,000	2,536,000	2,660,000	Brest	71,000	74,000	81,000
Marseilles	376,000	442,000	494,000	Nimes ..	70,000	74,000	80,000
Lyons ..	402,000	466,000	453,000	Tourcoing ..	58,000	73,000	79,000
Bordeaux..	241,000	256,000	257,000	Montpellier ..	57,000	73,000	76,000
Lille ..	188,000	216,000	215,000	Rennes ..	66,000	69,000	74,000
Toulouse..	148,000	149,000	147,000	Dijon ..	61,000	67,000	70,000
St. Etienne	118,000	136,000	146,000	Grenoble ..	52,000	64,000	68,000
Le Havre..	112,000	119,000	129,000	Orléans ..	61,000	66,000	67,000
Nantes ..	127,000	123,000	128,000	Tours ..	51,000	63,000	64,000
Nice ..	77,000	93,000	125,000	Le Mans ..	58,000	60,000	62,000
Roubaix ..	100,000	124,000	124,000	St. Denis ..	48,000	54,000	59,000
Rouen ..	107,000	113,000	115,000	Calais ..	59,000	56,000	59,000
Reims ..	98000	107,000	107,000	Besançon ..	56,000	57,000	55,000
Nancy ..	79,000	96,000	102,000	Versailles ..	50,000	54,000	54,000
Toulon ..	70,000	95,000	101,000	Levallois-Perret	29,000	47,000	54,000
Amiens ..	80,000	88,000	90,000	Troyes ..	47,000	52 000	53,000
Limoges ..	68,000	77,000	83,000	Béziers ..	43,000	48,000	52,000
Angers ..	73,000	77,000	82,000	Clermont-Ferrand	47,000	50,000	52,000

INTERNAL COMMERCE ON RAILWAYS AND WATERWAYS.

		Length.		Amount of Traffic.	
		Kilometres.	Miles.	Kilometre-Tons.[1]	Percentage
1895	Railways ..	36,337 ..	22,579 ..	12,898,000,000 ..	77 } 100
	Waterways ..	12,281 ..	7,631 ..	3,766,000,000 ..	23 }
1899	Railways ..	42,433 ..	26,355 ..	13,716,000,000 ..	75 } 100
	Waterways ...	12,130 ..	7,534 ..	4,489,000,000 ..	25 }

SHIPPING TRADE—EXTERNAL AND COASTING—OF THE CHIEF SEAPORTS.

In Tons weight of goods entered and cleared.

	1891.	1900.		1891.	1900.
Paris	6,878,000 ..	9,301,000	Dunkirk ..	2,132,000 ..	2,901,000
Marseilles ..	4,798,000 ..	6,221,000	Rouen ..	1,780,000 ..	2,684,000
Le Havre ..	3,044,000 ..	3,459,000	St. Nazaire ..	1,153.000 ..	1,755,000
Bordeaux ..	2,635,000 ..	2,853,000	Algiers ..	— ..	1,327,000

MERCHANT TONNAGE OF FRANCE.

	Sailing Ships.	Steamers.	Total.
1891	426,000 ..	522,000 ..	948,000 register tons.
1901	564,000 ..	546,000 ..	1,110,000 „ „

ANNUAL TRADE[2] OF FRANCE (*in pounds sterling*).

	1867–76.	1878–86.	1887–96.	1898–1901.
Imports ..	136,300,000 ..	178,400,000 ..	164,250,000 ..	184,000,000
Exports ..	132,250,000 ..	133,900,000 ..	136,300,000 ..	159,400,000

PERCENTAGE COMPOSITION OF SPECIAL IMPORTS.

	Food Products.	Raw Materials.	Manufactures.	Total.
1895.. ..	27·8 ..	56·5 ..	15·7 ..	100
1901.. ..	17·0 ..	66·3 ..	16·7 ..	100

PERCENTAGE COMPOSITION OF SPECIAL EXPORTS.

	Food Products.	Raw Materials.	Manufactures.	Total.
1895.. ..	17·5 ..	26·0 ..	56·5 ..	100
1901.. ..	18·7 ..	26·2 ..	55·1 ..	100

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[1] A kilometre-ton is 1 ton of goods carried for 1 kilometre of distance.

[2] Special trade only, *i.e.*, Exports of home products or manufactures and Imports consumed in the country.

FRENCH TRADE WITH OTHER COUNTRIES.

Mean of 1898–1900.

Country.	Total trade. Pounds sterling.	Imports into France. Pounds sterling.	Per cent. of imports.	Exports from France. Pounds sterling.	Per cent. of exports.
United Kingdom	70,000,000	23,500,000	13	46,500,000	29·6
French Colonies	34,000,000	16,000,000	9	18,000,000	11·2
Germany	33,700,000	16,200,000	9	17,500,000	11
Belgium	31,500,000	14,200,000	7·8	23,300,000	15
United States	30,500,000	20,800,000	11·4	9,700,000	6·2
Spain	15,500,000	10,500,000	5·7	5,000,000	3·2
Argentine Republic	13,000,000	11,000,000	6	2,000,000	1·3
Italy	12,500,000	6,000,000	3·2	6,500,000	4·2
Switzerland	12,000,000	3,500,000	2	8,500,000	5·4
Russia	10,700,000	9,200 000	5	1,500,000	1
All other countries	70,000,000	51,000,000	27·9	19,000,000	11·9

THE FOREIGN POSSESSIONS OF FRANCE

	Area sq. miles.	Population.
French India	200	273.000
French Indo-China	275,000	16,000,000
Algeria	184,000	4,740,000
Tunis	50,000	1,600,000
Sahara	1,300,000	—
French West Africa and French Congo	2,000,000	18,000,000
French Somaliland	14,000	200,000
Madagascar and Comoro	228,700	2,580,000
Réunion	900	173,000
American Possessions	31,000	380,000
New Caledonia	7,500	51,000
Pacific Islands	1,600	31,000
Total Foreign Possessions	4,100,000	44,500,000

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CHAPTER XVI.—SWITZERLAND

By Émile Chaix,

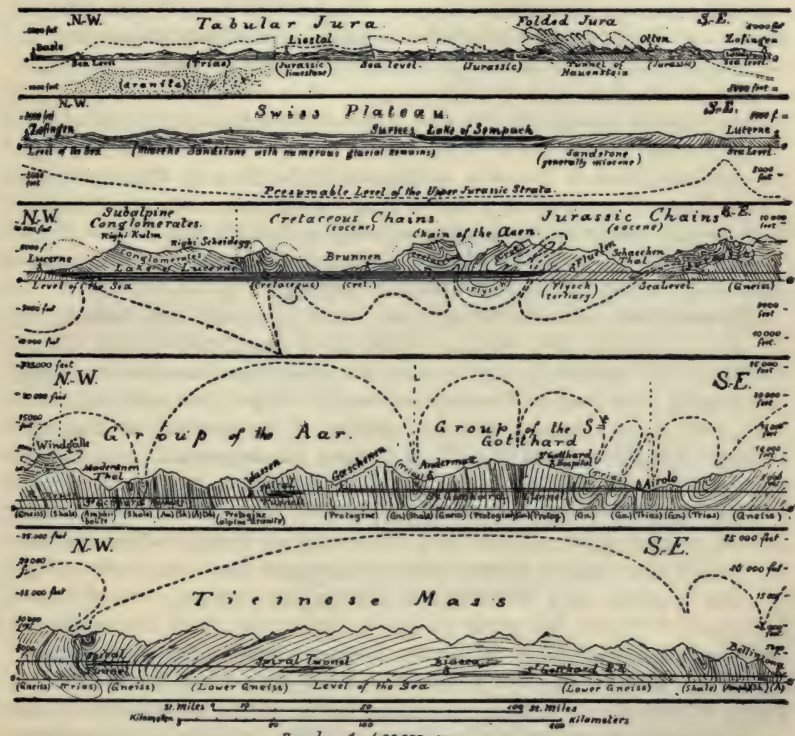
Professor of Geography in the Ecole Supérieure de Commerce of Geneva.

Position and Boundaries.—Switzerland (German *Schweiz* from Canton Schwyz, French *Suisse*, Italian *Svizzera*), lies between 46° and 48° N., or, on the average, 3° to the south of Lizard Head. It extends in longitude from 6° to 10½° E.; and is thus as far east from Greenwich as the Island of Valentia lies west of it. The country is somewhat less than half the extent of Ireland. It measures little more than 200 miles from west to east, and 120 from north to south. Switzerland is a sort of buffer State between France, Germany, Austria and Italy. The Jura mountains form a natural boundary towards France, and, except for the Canton of Ticino, the main crest of the Alps is the frontier towards Italy; but the details of the boundaries are complicated and do not follow natural features.

Configuration and Geology.—Switzerland is naturally divided into four geological zones, extending across the country from south-west to north-east, and roughly parallel to each other. The first zone, to the north-west, is formed by the *Jura*, a limestone region, some 3,000 feet in height, folded into a series of parallel waves. The second zone is the *Swiss Plateau*, composed of sandstone partially covered by the glacial deposits of the Ice Age. It is very irregular and hilly, varying in height between 1,000 and 3,000 feet above the sea. The remainder of Switzerland, about three-fifths of the whole, occupies the *Alps*, which are divided into two broad bands differing widely in character. The northern limestone Alps are stupendously folded, the folds being driven north-westward and piled up over each other. The central crystalline Alps occupy all the southern and south-eastern part of the land; they are formed of huge masses of gneiss, granite, and other crystalline rocks, cropping out amid schists, and rising in many places to over 13,000 feet (Fig. 130). The action of running water has deeply modified the primitive structure. Only a few rivers, viz., the upper parts of the Rhone, the Rhine, and the Inn, continue to flow along longitudinal valleys, parallel to the south-west and north-east trend of the original folds; most run through transverse valleys excavated right across the folds towards the north-west, and exhibiting a succession of gorges and basin-like expansions. Denudation has been and is still intense. Large rivers have pushed their sources as far back as they could, to the very heart of the mountain groups, cutting through or turning

obstacles, and each tributary is pursuing the same work in its smaller sphere of action.

Hydrography.—The principal system of rivers is formed by the Rhine and its tributaries flowing to the North Sea ; then come the Rhone, draining to the Mediterranean, the Ticino (Tessin), which discharges into Lago Maggiore and thence into the Adriatic, and the Inn flowing to


N.W.
Tabular Jura
Folded Jura
S.E.
Liestal
Zofingen
Basle
Sea Level
(Trias)
(granite)
(Jurassic limestone)
Sea level
(Jurassic)
Tunnel of Hauenstein
(Jurassic)
Swiss Plateau
Zofingen
Sursee
Lake of Sempach
Lucerne
Level of the Sea
(miocene Sandstone with numerous glacial erratics)
Sandstone (generally miocene)
Sea Level
Presumable Level of the Upper Jurassic Strata
N.W.
Subalpine Conglomerates
Rigi Kulm
Rigi Scheidegg
Cretaceous Chains (eocene)
Jurassic Chains (eocene)
S.E.
Lucerne
Conglomerate
Lake of Lucerne
Brunnen
Chain of the Aeen
Schaechen Thal
Level of the Sea
(Cretaceous)
(Cret.)
(Flysch (tertiary))
Sea Level
(Gneiss)
N.W.
S.E.
Group of the Aar.
Group of the St. Gothard
Windgalle
Maderaner Thal
Gneiss
Gotschen
Andermatt
Middland Rhine
(Trias)
Airolo
(Gneiss) (Shale) (Jurassic) (Shale) (Jurassic) (Shale) (Jurassic

Alps of Glarus ; on leaving the Lake of Zürich under the name of Limmat, it flows into the Aar close to the junction of the *Reuss.* The Upper Reuss, before traversing the Lake of Lucerne, has cut its way in wild gorges through all the folds of the northern Alps, and carried its head to the centre of the system, the group of the Furca, St. Gothard and Oberalp Passes. The *Aar* comes from the Grimsel Pass, and its tributaries have radiated into the middle of the Bernese Oberland ; it traverses the lakes of Brienz and Thun, and carries all the drainage of northern Switzerland tc the Rhine. The *Thièle* (Zihl) rises, under the name of Orbe, in the valley of Joux in the Jura, and after flowing for some miles in an underground channel, passes through the lakes of Neuchatel and Bienne to join the Aar.

The Rhone has cut its way through the French Jura, and through the northern folds of the Alps at the foot of the Dent du Midi, up to the Furca Pass. Its southern tributaries penetrate deep into the Pennine Alps, and it leaves Switzerland after passing through the largest of the lakes, the Lake of Geneva (Leman), which is rather more than 200 square miles in area, and 1,000 feet in maximum depth.

Mountains.—Besides being worn away by water and weather, all the Alpine system must have subsided after the glacial period. That movement determined the formation of the elongated lakes that surround the central Alps both in Switzerland and in Italy. The principal rivers have isolated and defined different groups of mountains (see Fig. 51). Between the Rhone and Aar lie the *Alpes Vaudoises* and the *Bernese Oberland*, with the summits of the Rochers de Naye, Moleson and Niesen in the limestone zone, and, in the crystalline zone, the Finsteraarhorn (14,026 feet), Jungfrau (13,672 feet), Mönch (13,440 feet), Wetterhorn, &c., grouped in one compact mass of snows and rugged peaks above the valleys of Lauterbrunnen and Grindelwald. More than twenty summits tower over 12,000 feet, and this group possesses the longest of all the 600 Swiss glaciers, the Aletsch Gletscher, sixteen miles in length. Between the Aar and Reuss extend the *Alps of Unterwald*, almost severed by the Brünig Pass. Among the summits the Brienzer Rothhorn and Pilatus (7,000 feet) are best known because of their railway. At the convergence of the head-waters of the Reuss, Rhine, and Ticino lies the *St. Gothard group*, cut off on all sides by important passes. Between the Reuss, the Rhine, and the Walen-see extend the *Alps of Glarus and Schwyz*, with the Tödi (11,887 feet) in its centre and the hotel-crowned Righi (5,906 feet) in its north-western corner. Farther to the north-east the romantic *Sentis group* (8,215 feet) is isolated by the Walensee. South of the long Rhone valley the *Pennine Alps* extend as a splendid chain, carved into gigantic buttresses by the short southern tributaries of the Rhone. Round Zermatt gathers the most bewildering succession of bold peaks : Monte Rosa (15,217 feet), Mischabelhörner with the Dom (14,941 feet), Weisshorn (14,803 feet), and the incomparable pinnacle of the Matterhorn or Cervin (14,705 feet). Over thirty other summits exceed 12,000 feet. The next group to the east are the *Alps of*

Ticino, profoundly trenched by torrent valleys. Between the Ticino, Rhine, and Inn lie the *Alps of Grisons* (Graubünden), a powerful complex, deeply cut into by the tributaries of the Rhine. It culminates in numerous summits exceeding 10,000 feet, including Piz Kesch, and Adula, and separated by the high passes of St. Bernardin, Splügen, Julier, and Albula. Lastly, to the south-east of the Inn the splendid *Bernina group* towers to a height of 13,288 feet. As to the *Jura*, its summits do not exceed 5,500 feet, and its limestone ridges have effectively withstood partition by rivers.

Perpetual snow begins at heights varying between 8,500 and 10,000 feet, according to the exposure of the slopes, to their convex or concave profile, and to the extent of the high masses; but glaciers come down to 4,500 feet. Perpetual ice and snow spread over 800 square miles, or one-twentieth of the total area of Switzerland.

Climate.—Were Switzerland at sea-level it would enjoy a temperature varying between 35° F. for the average in January, and 72° for July. But this normal temperature is greatly modified by the altitude, diminishing on an average by 3° for each thousand feet of elevation. Thus the mean temperature of the plateau oscillates with the altitude between 32° and 26° for January, and between 68° and 62° for July, while much lower temperatures occur on the mountains. Another cause of great differences in climate is the exposure: the northern slopes of the mountains never receive direct sunshine, while the southern slopes catch the solar rays as perpendicularly as flat ground does in the tropics. During winter, regions above 6,000 feet often enjoy splendid weather while cold fogs gather in the lower valleys. There are great extremes of temperature in consequence of strong insolation during the day, and active radiation at night through the pure and thin air of the heights; and above 4,000 or 5,000 feet the atmosphere is exceedingly free from noxious micro-organisms.

Cloudiness and rainfall are great; rain falls mostly with westerly and southerly winds, and the amount varies with the exposure of the slopes. Windward slopes generally get more than 60 inches of rain yearly (some as much as 90); but Geneva receives less than 33 inches, and parts of Canton Valais only 20, being protected by mountain ramparts 10,000 feet high on all sides. The dry hot Föhn wind descending the northern slopes of the Alps is a characteristic feature of some valleys. As a whole the climate of Switzerland is not favourable to agriculture, but it is invigorating for man.

Flora and Fauna.—Switzerland possesses many wild plants and animals which, although interesting, are generally useless. The flora of the summits, many members of which grow also in Scandinavia and Spitsbergen, is charming. One-third of the area of Switzerland is entirely valueless, being covered with ice or bare rock, while of the remainder more than half is available only as pasture, one-third is clad with forest, and only one-ninth of the whole area can be cultivated. Between

6,500 and 4,000 feet forests are composed of Rolle pines (*Pinus cembra*), larches and fir-trees ; under 4,000 feet beeches are prevalent, and oaks and chestnut-trees are abundant only in the southernmost parts of the country. Agriculture is generally not practised above 2,500 feet.

Wild animals are becoming rare ; hardly a bear is left, no wolves and few lynxes ; there are no more ibex (*Capra ibex*), chamois are few and extremely shy, and so are marmots and blackcock (*Tetrao urogallus*). Eagles and bearded vultures (*Gypaetus barbatus, Lämmergeier*) are quickly disappearing.

People and History.—The first inhabitants of Switzerland who left somewhat important traces were the lake-dwellers ; but the earliest in historic times were the *Helvetians*, of Keltic race. They were conquered by Julius Cæsar, and Helvetia remained under Roman rule down to the great migrations from the north. Then it was occupied by three peoples : the *Allemanni* in the north and east, the *Burgundians* in the west, and the *Ostro-Goths* in the south. The Allemanni retained their Germanic language, while the others adopted the Latin. In the fifth century Helvetia was united under the Franks, and Christianity was established by Irish missionaries. In the eleventh century the German Emperors ruled over the whole country. The Dukes of Austria subsequently attempted to usurp the government, but the Cantons of Schwyz, Uri and Unterwald, which had made a first covenant in 1291, renewed it at the Grütli in 1307, and resisted and defeated the Austrians at Morgarten. In the first half of the fourteenth century Lucerne, Zürich, Glarus, Zug and Bern joined these cantons, and this Confederation of Eight Cantons after many wars became free of the German Empire, and from time to time their number was increased. During the first Revolution the French entered Vaud in 1798, and in place of the Confederation of Thirteen Cantons, then existing, they erected a " Republic one and indivisible," as in France. But there was no peace in the country until the former Federation was restored in 1815, with the accession of fresh cantons, making twenty-two in all. The neutrality of the Confederation is now guaranteed by the European Powers.

FIG. 131.—*The Languages of Switzerland.*

Language, Religion, and Government.—Switzerland has inherited many things from its past, especially in the distribution of religions and languages. Of the total population, 72 per cent. speak a German dialect, 5 per

cent. Italian (in Ticino), 1 per cent. Raetho-Romanch dialects (in Grisons), and 22 per cent. French (in Valais and Fribourg, Geneva, Vaud, Neuchatel and the Bernese Jura). The non-German part of the country is often termed Roman or Welsh Switzerland. On account of the vast number of tourists who visit Switzerland, English is spoken as a foreign language by a very large number of the people. In religion the cantons of Bern, Glarus Neuchatel, Schaffhausen, Thurgau, Vaud and Zürich are almost entirely Protestant; those of Fribourg, Lucerne, Schwyz, Ticino, Unterwald, Uri, Valais and Zug are almost entirely Roman Catholic. In the other cantons the two religions are more or less mixed. On the whole three-fifths of the population are Protestant, and two-fifths Roman Catholic; there are only 8,000 Jews.

FIG. 132.—*The Religions of Switzerland.*

The federal institutions are obviously a consequence of the topography and history of Switzerland, the people of each valley or region having long lived by themselves before uniting with their neighbours. Each canton is a State, with its own constitution and government; but common affairs are administered by a common executive power and two legislative assemblies. Every citizen has a vote. Two important and unusual rights exist: the *Referendum*, by which the people can always oblige the authorities to submit newly made laws to a general vote of the country; and the *Right of Initiative*, by which a group of citizens may at any time propose any new measures and submit them to a general vote.

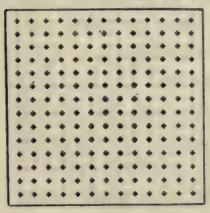


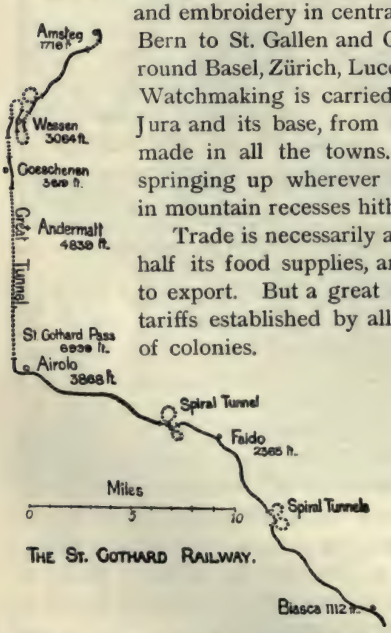
FIG. 133.—*Average Population of a square mile of Switzerland.*

Public instruction has long been general, and is constantly progressing. Besides the general schools, there are all kinds of educational institutions, technical, agricultural, commercial, and six universities, with their seats in Basel, Bern, Geneva, Lausanne, Zürich and Fribourg.

Emigration is large, but the population nevertheless increases. The mean density of population is 184 inhabitants to the square mile; but it naturally varies greatly. In the industrial cantons—such as Geneva (914), Basel, and Zürich—it is high; in the agricultural cantons it approaches the average; and in the Alpine cantons like Valais, Uri, and especially Grisons (34), it is very low.

Industries and Trade.—Agriculture is as well developed as it can

be with mediocre soil and climate. Wheat is grown everywhere on the Plateau under 2,500 feet, but it yields only half the quantity required in the country. Grapes are cultivated, in good exposures, generally up to 1,500 feet (in Valais and Ticino even to 2,000 feet); but the country wants twice as much wine as it produces. Wood must be imported. Even cattle and meat are not sufficient; cattle, however, are reared for dairy produce, and furnish under that form a good export, cheese being made everywhere, and condensed milk in many places. Silkworms are reared in Ticino. Notwithstanding the absolute lack of raw materials, there is a strong industrial development. The principal industry is cotton manufacture and embroidery in central and north-eastern Switzerland, from Bern to St. Gallen and Glarus; then come silk manufactures round Basel, Zürich, Lucerne and in Ticino, and straw-plaiting. Watchmaking is carried on on a very large scale along the Jura and its base, from Geneva to Basel; and machinery is made in all the towns. Electro-chemical works are now springing up wherever water-power may be obtained, even in mountain recesses hitherto untouched by manufactures.



THE ST. GOTHARD RAILWAY.

FIG. 134.—*Map of the St. Gothard Railway.*

Trade is necessarily active in a country which must import half its food supplies, and has so many manufactured goods to export. But a great inconvenience results from the high tariffs established by all surrounding countries and the lack of colonies.

Communications.—Roads and railways are very difficult to establish on account of the configuration of the land. Yet the network of roads is complete, and that of railways is already highly developed. Good carriage roads follow all the large valleys of the Alps, and many high passes are crossed by splendid causeways. Five railways cross the Jura. There are two great trans-alpine lines, one carried under the St. Gothard (see plan in Fig. 134, and section in Fig. 130), and the other, which is the longest tunnel in the world, twelve miles, under the Simplon, from the Rhone valley. The Plateau is covered with a complete network of railways, and lines penetrate along many valleys into the very heart of the Alps. Some important international routes pass through Switzerland, especially the St. Gothard route from Germany to Italy through Basel, Lucerne and on to Milan; the Arlberg route from France to Austria through Basel, Zürich and eastward through the Arlberg tunnel; and from the south of France to Bavaria, through Geneva, Bern, Zürich and Winterthur. For the convenience of tourists a great many mountain railways have been con-

structed, actuated by cog-wheels, or worked by cables, and a daring project for an underground railway to the summit of the Jungfrau is in progress. Only the lakes and very short stretches of a few rivers are available for navigation. Post, telegraph and telephone penetrate everywhere, and are highly organised.

Cantons and Towns.—Soil, climate, and all conditions of existence are so much better on the Plateau, that most of the inhabitants and important towns are found there, though the progress of communications and industry, and the increase of pleasure-tours have led to the growth of noteworthy places everywhere. The canton of **Grisons** (Graubünden) occupies the upper basins of the Rhine and Inn. *Coire* (Chur) was an important station for the Romans, and is yet noteworthy because of its situation at the convergence of many frequented passes. *Davos*, in a high valley, is much resorted to as a winter sanatorium. The Engadine, the elevated valley of the upper Inn, has an excellent summer climate, splendid mountains, lovely lakes, and important mineral springs at *St. Moritz* and *Tarasp*, which attract many tourists. The canton of **Uri** occupies the upper valley of the Reuss. The railway ascends the valley by loops and spiral tunnels to *Goeschenen*, where it enters the long horizontal tunnel of St. Gothard. But the carriage road continues over the Devil's Bridge to the valley of *Andermatt*, where four passes meet, now defended by fortifications The canton of **Unterwalden** lies among the mountains south of the lake of Lucerne traversed by the railway to the Brünig pass. The canton of **Schwyz**, the centre of Swiss freedom, touches the lakes of Lucerne and of Zürich. *Schwyz* is surrounded by many visited resorts, including the battlefield of Morgarten, *Einsiedeln* with its pilgrimage, and the Righi. The canton of **Glarus** occupies the quiet, secluded valley of the Linth ; and its villages are full of cotton-factories. The canton of **St. Gall** extends between the Rhine and the Lakes of Constance, Zürich and Walenstatt. The manufacturing town of *St. Gall* preserves the rich manuscript collection of its ancient monastery. *Ragatz* is much frequented for its hot springs. The lovely canton of **Appenzell,** round the Sentis, has active manufactures of cotton goods and embroideries in all its towns.

FIG. 135.—*The Swiss Flag.*

Thurgovia (Thurgau), along the lake of Constance, has an active import of Hungarian corn at *Romanshorn* on the lake The canton of **Schaffhausen** projects into Germany beyond the Rhine. *Schaffhausen* and *Neuhausen* stand near the Rhine cataract ; the former is known for its mediæval appearance ; the latter for its manufacture of arms and aluminium. The canton of **Zürich** is a great centre of industry. *Zürich* is the largest town in Switzerland. It possesses a university, the federal Polytechnicum, the national museum and important manufactories for silk and machinery. *Winterthur* is very important as a manufacturing town.

The canton of **Zug,** with its pretty capital, is concerned with textile manufactures. The canton of **Lucerne** contains the town of *Lucerne,* with its old towers, its covered wooden bridges and other attractions, which is much visited by tourists because of its situation near Mount Pilatus, the Righi and the picturesque lake.

Argovia (Aargau) occupies an exceptional position near the confluences of the Rhine, Aar, Limmatt, and Reuss. *Aarau* is known for its manufacture of mathematical instruments. Near *Brugg* stand the ruins of Habsburg Castle, the cradle of the imperial family of Austria, and those of a large Roman city, Vindonissa. The canton of **Basel** (Bâle) lies at the point where the Rhine leaves Swiss territory. The town of *Basel* has always been conspicuous because of its situation which makes it the busiest railway centre in the country. The canton of **Soleure** (Solothurn) is half on the Aar and half in the Jura. *Soleure,* with the surrounding small towns, and *Olten,* where important railways meet, are all busy with machinery and smelting works. The canton of **Bern** is large, occupying the Oberland, a part of the Plateau and the Bernese Jura. *Bern* is the federal capital, containing the federal palaces, numerous international offices, a fine cathedral and university. The Emmenthal is far-famed for its cheese, but is still more active in weaving and spinning. The Bernese Jura with *Bienne* (Biel), and other towns and villages, are occupied with watch-making. *Thun,* in a lovely situation, is the principal military centre in Switzerland. Between the two lakes of Thun and Brienz, *Interlaken* is a haunt of tourists visiting the grand scenery of the Oberland. The canton of **Fribourg** on the Sarine is covered with excellent pastures. *Fribourg,* an old town on a picturesque site, with celebrated suspension bridges over the surrounding gorges, has a Roman Catholic university. Further up stands *Gruyère,* in a lovely valley famed for its cheese.

The canton of **Neuchatel** is well known for watch-making. The town of *Neuchatel* is more celebrated for its schools, its museum and its wine, but *Chaux-de-fonds,* in an arid region over 3,000 feet in elevation, and *Le Locle,* with a watchmakers' school, are the greatest centres for watch-making in Europe. The agricultural canton of **Vaud** extends from the Jura to the Alps. *Lausanne* occupies a magnificent position. It possesses a very beautiful cathedral, the federal supreme courts and a university. Along the eastern bank of the lake, named La Vaux, and famed for its wine, lie *Vevey, Montreux,* and other resorts of invalids and tourists in spring and autumn. In the north, *Avenches* (Aventicum) was the capital of the Roman Helvetia, and *Ste. Croix* is known for its manufacture of musical-boxes. The canton of **Geneva,** at the west end of the Lake of Geneva, is almost entirely surrounded by French territory, which lessens the natural advantages of its situation. *Geneva* is very old, but has few ancient remains. It is famed as a religious, educational and scientific centre. The making of chronometers, jewels, scientific instruments and chemicals is very active, particularly since the establishment of great water-works on the Rhone

generating, as it leaves the Lake of Geneva, 30,000 horse power. The canton of **Valais** occupies the high valley of the Rhone. *Sion* is picturesquely dominated by three rocks crowned with ruins, and *Martigny* stands at the entrance of the valley leading to the far-famed Grand St. Bernard. *Leukerbad* (Louéche), at the foot of the Gemmi pass, is known for its hot springs. To the south of the Rhone a series of splendid side valleys opens, in one of which *Zermatt* lies at the foot of the Matterhorn. Farther up *Brieg* is a point whence roads radiate to numerous passes including the Simplon Road, established by Napoleon I. for war purposes, which has served as a model for subsequent mountain-roads. The canton of **Ticino**, on the southern slopes of the Alps, is occupied by people speaking Italian. *Bellinzona* is the chief town. At the entrance of the St. Gothard tunnel lies *Airolo*, now fortified. *Locarno*, on Lago Maggiore, and *Lugano* on the northern bank of its lake, enjoy marvellous scenery, and wholly Italian climate and vegetation.

STATISTICS.

	1880.	1890.	1900.
Area of Switzerland square miles	15,964	15,964	15,964
Population	2,827,572	2,938,009	3,315,443
Density of population per square mile ..	177	184	207
Population of Zürich	75,960	96,900	152,942
„ „ Basel	61,400	63,500	113,000
„ „ Geneva	68 300	74,800	105,139
„ „ Bern	44,100	46,500	64,864

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[1] The statistics of value of trade commence in 1885.

CHAPTER XVII.—THE GERMAN EMPIRE

By Dr. Alfred Kirchhoff,[1]

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Position and Extent. — Germany is the most central country of Europe. It occupies almost the whole north and west of central Europe viewed from the morphological centre of the continent, the Fichtelgebirge, as the main mass of Austria occupies the south and east from the same centre. Germany extends from the Alps to the North Sea and the Baltic, over a range of latitude corresponding to that from the mouth of the Loire and the north-eastern apex of the Sea of Azov in the south, to that of Glasgow and Moscow in the north. The position in longitude is the same as that of Scandinavia and of Italy. South Germany, a comparatively narrow tract south of the northern watershed of the Main, is enclosed by France, Switzerland, and Austria-Hungary ; North Germany, which is much larger, is bounded on the west by Holland, Belgium, and Luxemburg, and on the east by Russia and Austria-Hungary. Almost two-thirds of the boundaries of Germany are land frontiers, and one-third is composed of sea coast on the north. The peninsula of Jutland projects between the short coast-line on the North Sea and the much longer coast of the Baltic, forming the bridge between Germany and Danish Jutland, and, next to East Prussia, the most northerly part of the German Empire. The length of Germany in a north and south direction, from the Königsau, the boundary river towards Jutland, to the southern point of Bavaria near the source of the Iller, is exactly the same as that of Great Britain. From the north-west to the south-east, from northern Schleswig to Upper Silesia, the distance is also almost the same ; but the diagonal from south-west to north-east, from Upper Alsace to East Prussia, is much longer ; the distance being as great as from Gibraltar to Nice. Amongst the countries of Europe, Germany is only surpassed in area by Russia and Austria-Hungary ; France comes very closely after it, and Spain is not much smaller. South Germany extends, like the south of England, through 8° of longitude, while North Germany extends over 17°.

Configuration.—The German Empire has been formed in the great natural region of Central Europe, which is shared also by Holland, Belgium, Luxemburg, Switzerland, and the part of Austria which belonged to the German Confederation until 1866. But Germany alone occupies

[1] Translated from the German by the Editor.

part of all the four zones into which the surface of Central Europe is naturally divided, viz., the Alps, Alpine Foreland, Central Highlands, and Northern Plain.

The Alps.—Germany has but a small share of the Alps, limited only to the northern limestone Alps on the southern borders of Bavaria, between the Lake of Constance and Salzburg. In this district alone does the surface of Germany approach or exceed 6,500 feet in elevation, heaved up by the great pressure from the south to which the Alps as a whole owe their origin. Here alone does Germany extend into the region of eternal snow, the highest summit being the Zugspitze, 9,710 feet above sea-level.

The Alpine Foreland.—Germany occupies the Alpine Foreland from the Lake of Constance to the mouth of the Inn. Together with the German Alps this Swabian-Bavarian high plain forms the German portion of the Danube basin, an undulating surface averaging 1,600 feet in elevation. In the Tertiary period this region was occupied by the great sea which extended from the Rhone in France through the north of Switzerland and across the Alps to Hungary and Rumania. The surface of the high plain is, however, only partly composed of sediments deposited in that sea; it is in great part covered by material more recently derived from the moraines of the huge Alpine glaciers of the Great Ice Age, which extended as far as the latitude of Munich, and by the alluvial deposits formed by the running water when these glaciers finally melted.

FIG. 136.—*Natural Divisions of Germany.*

The Central Highlands, extending north of the Danube from the Carpathians to the Rhine, exhibit the greatest variety in the direction of their heights and the arrangement of their rocks. One extensive low plain, that of the upper Rhine, is embedded amongst these heights. The structure of the mountains exhibits no recent upridging like the Alps; they scarcely anywhere exceed 5,000 feet in height, Schneekoppe, in the Riesengebirge, alone reaching 5,266 feet. All geological formations are represented like mosaic work, although the Mesozoic, and particularly the Triassic, preponderate in the South-West German basin, Hesse, and Thuringia. The strata of the Central Highlands are for the most part ancient marine deposits. The most extensive mountain group of the region is that of the North German Rhine Highlands, composed of Devonian schists, but it is much too small to have been formed on the floor of an independent division of the sea. Hence it follows that

the scattered portions of the same ancient marine formations, *e.g.*, the Coal Measures appearing on the edge of the Rhine Highlands, in Saxony and in Silesia, are connected by continuous strata underground, or that the once continuous strata have been worn away by denudation. In fact, the variegated mosaic of this tesselated region can only be understood when one recognises it as a land where the Earth's crust has been dislocated and broken up into blocks—a *Schollenland*. The isolated Palæozoic masses show clearly how the Devonian strata of the Rhine, the Hartz, the Frankenwald, and the Sudetes have undergone violent disturbance, being wrinkled into ridges and domes, although the primitive foldings do not figure prominently in the scenery of to-day. The action of the encroaching and receding sea and the continual influence of atmospheric erosion have worn the crests away, until only the exceptionally hard rocks of the centre of the folds remain ; a good example of this is seen in the quartzite hills of the Hunsrück and Taunus. During the Cretaceous period the sea withdrew, so that Cretaceous formations are found only along the north-eastern edge of the Central Highlands from the Belgian frontier to Silesia. In the course of the Tertiary period the last portions of the land emerged from the sea. Then followed the fracturing and subsidence of the isolated blocks of the Earth's crust, with or without marginal elevations, and the upwelling of molten rock, as shown by the basalt flows of the Siebengebirge, the Rhön and the Vogelsberg, and also by the little volcanoes of the Eifel, which did not become extinct until Quaternary times. The lines of fracture along which subsidence and the corresponding uptilting have taken place follow three special directions : (*a*) From north-west to south-east, the *Hercynian* (so-called from the Hartz) line of strike, marked by the Weser mountains in the north, the Thuringian mountains, the Hartz, the Bohemian Forest, and the Sudetes. (*b*) From south-west to north-east, as shown by the slate Rhine Highlands, the Swabian and Franconian Jura, and the Erzgebirge. (*c*) From north-north-east to south-south-west, including the Black Forest and Odenwald, the Vosges and the Hardt.

Where the land remains highest as a rule denudation has been most complete, so that the upper sedimentary layers have been entirely removed, exposing the deep foundations of Archæan rocks which now form the summits of the Black Forest, the Vosges, the Brocken dominating the Hartz, and the highest crests of the Erzgebirge and Riesengebirge, all of which are composed of granite, gneiss, and mica-schist. In the lower grounds the less ancient marine sediments have been more protected from erosion, and, for example, the Trias, Bunter sandstone, Muschelkalk, and Keuper still remain in the Thuringian Basin, while they have been worn away both from the Hartz, which bounds the basin on the north, and from the Thuringian and Franconian forests which enclose it on the south. The existence of patches of Muschelkalk left on the southern Thuringian mountains proves that the sediment of the Triassic sea had at one time spread

over that district also. In the same way Triassic rocks are still found in the lower parts of the Black Forest and also on the Swabian-Franconian Terraces ; whilst the Swabian-Franconian Jura is named from the Jurassic rocks which at a considerable elevation above the sea rest upon the triple series of the Trias. The existence of Jurassic pebbles on the slopes of the granitic Feldberg similarly reveals the fact that at one time Triassic and Jurassic strata rested high over the southern part of the Black Forest.

Crûstal movements have not yet quite died away in the Central German Highlands. Where the solid mountain mass of the Black Forest with the Odenwald, and the Vosges with the Hardt, is trenched by the Upper Rhine Plain earthquake shocks are frequently experienced travelling in the direction of the Rhine, showing that deep within the Earth the vast rift which separates these blocks of the crust is still an unhealed wound.

That the present relief of the Central German Highlands is more recent than the rivers of the region can be recognised from the fact that the rivers often flow in directions directly opposite to the general elevations of the land, frequently breaking through the highlands in valleys of erosion excavated by their own flow. Thus the Weser traverses the Weser chain, the Rhine flows in its gorge across the Rhine Highlands, and the Elbe through the Bohemian mountain barrier. The Main and the Neckar in their middle courses flow between high plains, which are less elevated than the mountain crests separating them from the Rhine, into which at one period they were enabled to force a passage in consequence of the relation of height having become inverted.

The Northern Plain is the lowest and flattest part of Germany, yet only in parts is it a complete low plain. Its foundation consists of depressed blocks of all formations down to the Tertiary, for in the Tertiary period it was still covered by the sea. Even yet a few small island-like portions of the sunken crust-blocks project as hard rocks, such as the chalk cliffs of Rügen and a plateau of Muschelkalk near Rüdersdorf, to the east of Berlin. For the rest the whole plain consists, like the Alpine Foreland, not of "real rocks," but of soft material of Quaternary age, mainly sands and clays of alluvial and glacial origin. The ice-sheet of the Great Ice Age which extended from Scandinavia over the German plain has covered a great part of the land with the stiff clay of its ground-moraine mixed with boulders of ancient formations, the accumulations sometimes forming considerable eminences. Thus the land is by no means flat or level, although its height rarely exceeds 600 feet. On the melting of the ice, boulders of red granite and of gneiss carried over from Sweden were left scattered as "foundlings" or erratic blocks over the plain. As the land became free from ice the rivers which began to furrow its surface easily washed away the soft clay and deposited it in flood-time, forming meadows along the banks and round the river-mouths.

A low coastal plain extends along the shore of the North Sea, separated from the tide-washed beach by a broken chain of sand-dunes. The sea is

encroaching, and has already separated from the land the line of the Frisian islands, which stretch from the Zuider Zee to the unbroken coast of Jutland, and, like the fertile land of the low coast, are still the prey of the devouring ocean. The shallow flats, or "Watten," only uncovered at low tide, merge on the landward side into the "marshes," which, being a little higher on account of the material washed up by the sea, are only reached by water at high tide. These tracts have been utilised since the Middle Ages, the people protecting them from the sea by constructing the "golden hoop" of dykes or sea-walls. The pastures and corn-fields of this district pass without any orographical difference into the less fruitful soil of the sandy diluvium of the "Geest."

Hydrography.—The Central Highlands and the Northern Plain belong to the North Sea and Baltic drainage areas, their rivers flowing as a rule in a northerly or north-westerly direction, thus contrasting with the German Alps and Alpine Foreland, which belong to the Black Sea drainage area, with the east-flowing Danube as the main river. The *Rhine* is the only river which binds southern to northern Germany, crossing the Central Highlands. Its sources rise in Switzerland, its delta forms Holland, yet the main part of its course makes it a German river, and on account of its facilities for navigation, its great wealth of water, and its exceptional depth, the most useful of them all. In summer, when the other rivers, the Danube system excepted, shrink on account of drought, the Rhine is fed by the melting of the Alpine glaciers. The system of tributaries on either side of the main stream is developed with beautiful symmetry, the longest flowing in near the middle of its course where the Mosel describes its great curve from the French slopes of the Vosges, and the Main pursues its zigzag course from the Fichtelgebirge. The whole of the South German Highlands except the south-eastern slopes of the Jura draining to the Danube, sends its rivers to the Rhine. On the contrary, North Germany is shared by several different river systems. The small *Ems* and *Weser* in the west are entirely German from source to sea, and so also is the *Oder* in the east with the exception of its actual source in Moravia. Between these the *Elbe* has sunk its roots most deeply into the innermost recesses of the Central European mountains, where it gathers the converging drainage of the Bohemian Basin, and discharges it into the North Sea. The share of Germany in the Russian rivers *Vistula* (Weichsel) and *Memel* is but small. Both of these discharge wholly or in part through great lagoons or "haffs" into the Baltic. The Oder also discharges through such a lagoon, the Stettiner Haff, which is united to the sea by channels between the two islands of Usedom and Wollin, while the Frisches Haff, into which a branch of the Vistula flows, and the Kurisches Haff, which receives the Memel, are almost cut off from the sea by narrow spits of sand.

Rivers of the Plain.—All the great rivers of the Northern Plain have a peculiarity in common. Each receives its longest tributaries on

the right, so that, instead of flowing across the plain in the centre of its drainage area, each river runs close to its western watershed. The long eastern tributary of the Ems is the Haase, of the Weser the Aller, of the Elbe the Havel, of the Oder the Netze, and of the Vistula the Bug. The sudden change of course from west to north in the Elbe at 52° N., in the Vistula at 53° N., is extremely striking. It would seem as if the Elbe at one time flowed through the present valley of the Aller and had received the Weser at Verden. The Oder similarly has at one time evidently continued its north-westerly course (south of Frankfort) and received on its left bank a great stream, pursuing its way to the sea at the present mouth of the Elbe. This primitive river must have been the Vistula, which then flowed along the southern base of the Baltic lake plateau. The primitive Vistula then found a way for the first time across this elevation down the Oder gorge to the present Stettiner Haff, the Elbe taking over its old mouth; a second time, and nearer its source, it found another way across the ridge to the Danziger Haff, by

FIG. 137.—*The Rivers of the North German Plain.*

which its former tributary, the Oder, was left an independent river with the deserted mouth. All these changes were brought about by the influence of Earth-movements which the crust-blocks, or "buried mountains," experienced far into the Quaternary period. In a plain quite small alterations in level suffice to break up the arrangement of river systems and to allow them to form new combinations. The great deserted valleys are still before us; for example, the valley of the prehistoric Oder is now utilised by the Friedrich Wilhelm's Canal to unite the Oder and the Spree, and nearer Berlin the small Spree in the great richly wooded valley of the primitive river is as little in harmony with its surroundings as a mouse in the cage of a lion. Hydrologically, however, all these bendings to the north result from the law that rivers, as soon as they have secured a shorter course, leave the earlier one in stagnation, so far as a portion of the earlier course is not taken possession of by a former tributary and thereby restored to activity. The portions of the ancient valley which have become swampy have in favourable circumstances been again utilised in order to restore the

prehistoric river-communications and render them available for boats ; on the site of the first deviation the Finow Canal now unites the Oder and the Havel, on the site of the second deviation the Bromberger Canal unites the Vistula and the Oder system.

Lakes.—Lakes are most abundant on the most recent geological formations, the Alpine Foreland and the Northern Plain. The lakes of the *Alpine Foreland* are clearly related to the immense ice-sheet which descended from the Alps during the Great Ice Age, since the lakes only appear on ground which was once covered by glacier-ice. A few small lakes lie amongst the mountains themselves, including the charming Tegernsee and the Königsee in the most southerly corner of Germany. The others lie at the northern base of the Alps, including Lakes Starnberg and Ammer south-west of Munich, the broader lake of Chiem between the Inn and Salzburg, and innumerable smaller sheets of water, dwindling to mere pools amongst the ancient moraine mounds.

The *Baltic Lake Plateau* in the north-east of the Northern Plain is thickly pitted with small lakes, as its name implies. Many of the curiously irregular lakes of East Prussia resemble those of Finland, and are of considerable depth. The shallow shore lakes lying behind the chain of dunes on the Pomeranian coast are of quite a different type, identical in formation with the Haffs, although the latter are in free communication with the sea ; thus the Kurisches Haff may be considered the largest lake in Germany. The other parts of the Northern Plain are much poorer in sheets of water, particularly to the west of the Elbe, where the low-lying and very flat land, in consequence of the damp climate, has been overgrown and its lake basins filled up by the typical vegetation of the moors.

The *Central Highlands* have few lakes ; but in bygone ages many of their valleys have been temporarily occupied by sheets of water. The largest is the rift valley of the Upper Rhine Plain, which was a gulf of the sea in Tertiary times, stretching northward from the present Switzerland, just as the existing Red Sea (the Erythræan rift valley) stretches northward from the Indian Ocean. The uplift of the Jura mountains shut off the gulf and changed it into a lake, which in course of time became filled up by sediment from the rivers, and converted into a plain.

Climate.—The mean annual temperature (reduced to sea-level) of the west of Germany is the same as that of the British Islands, while that of the region east of the Oder is similar to the climate of Denmark and the south of Sweden. The mean annual isotherms cross Germany from north-west to south-east ; in other words, the climate grows colder from the south-west towards the north-east. In summer the zones of temperature correspond more closely with the parallels of latitude, tending to bend northward in the east, because at that season the greater specific heat of the land compared with the sea makes itself most felt on the air temperature in the east, where the land is widest. Thus the temperature of the air in South Germany in July is higher than 70° F., being equal to that in Central France, while

in North Germany it is lower than 70° being the same as in England. In winter, on the contrary, the south is no warmer than the north in the same longitude; but the east of the country is much colder than the west. In winter also the contrast between the high pressure area over the Azores and the low pressure near Iceland is increased, and frequent cyclonic storms sweep over the north-west of Germany. On this account the warm south-westerly and westerly winds from the Atlantic blow most frequently in winter, and western Germany consequently enjoys a mild climate, while the east suffers from unbroken frost. The isotherm of 32° F. in January enters Germany at the mouth of the Weser, runs southward, and finally curves eastward through Munich. The North Sea coast of Germany remains almost free from frost, while the harbours on the Baltic coast are usually closed by ice, and the further east they lie the longer is their trade arrested, the increasing shallowness and smaller salinity of the Baltic conspiring to increase the effects of the colder winter. The water of the Baltic in spring cannot rise above the freezing-point until the last of the ice has melted, hence the spring on the Baltic coasts is cold and late. In the Rhine district, when the swallows return and the almond and apricot blossoms are opening, snow is still lying in East Prussia, where the frost does not break up until the middle of March. The different elevation of the land necessarily deranges the simplicity of the distribution of temperature outlined above. The south-western plains and valleys of the Rhine, Mosel, Neckar, and Main, are actually the warmest parts of the country, enjoying an annual mean temperature of over 50° F., with hot summers and mild winters, because they lie low. On the other hand, the high land of South Germany is in no way more favoured by climate than the northern low plain. Munich and Königsberg have the same high temperature in July and very nearly the same degree of cold in January. High mountains everywhere act as refrigerators for the surrounding districts, and they act most vigorously in summer, when the temperature falls more rapidly than at other seasons with the increase of height.

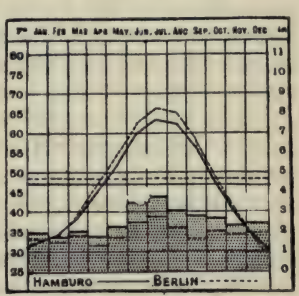

FIG. 138.—*Mean Monthly Temperature and Rainfall Curves for Hamburg and Berlin.*

The mountains similarly receive the heaviest precipitation (on the average about, or over, 40 inches per annum) especially on their western and south-western slopes. The average rainfall for Germany is about 28 inches; it is greater in the west, where the moist westerly winds prevail; and there it attains a maximum in July. In most places the rainfall is limited to about 20 inches per annum; in the north-east there are some areas with less, while on the North Sea coast it may rise to over 27

inches on account of the moist sea winds blowing upon the rough land (Fig. 53).

Flora and Fauna.—Of the whole area of Germany at the present time 49 per cent. is cultivated, 20 per cent. consists of natural pasture, 26 per cent. is under forests, and only 5 per cent. can be classed as waste land. Thus the original plants and animals of the country can occupy only a very small area, the forests even being no longer in a state of nature, but under systematic management. Yet the German flora and fauna are extensive enough, including at least 2,250 species of vascular plants and 16,000 species of insects alone. During the Great Ice Age the severe climate reduced the abundant life of the earlier time to a few surviving species strong enough to withstand it. In the Steppe period which followed, the vacant German lands were invaded from the arid regions of the south-east, as far as the Kirghiz steppe, by many species of plants and animals including the Saiga antelope, jerboa, and hamster. The feather-grass (*Stipa*) of the Hungarian and Black Sea steppes also obtained a footing in Germany at this period. Almost all the animals peculiar to the Steppe retired again to the east when the climate became moister, and the land once more became wooded, not this time with tropical exuberance, but with northern simplicity. The hamster remains in many parts of Germany a surviving relic of the Steppe period. Most of the present plants and animals result from the post-glacial invasions from the east with which Germany is so closely connected in soil and climate. Thus there are comparatively few species peculiar to the country; of the 220 species of birds not one is confined to Germany. The larger wild animals, especially the bear and wolf, have been exterminated, and the last bison was killed in 1775. The stag, roe, and wild boar still people the forests; the reindeer has disappeared since the Middle Ages, but the elk is still found in one of the forests of East Prussia. The chamois and marmot are found only in the Alps above the tree limit. Reptiles requiring a dry, warm climate are not numerous; all the varieties of lizard and snake known in Germany inhabit the south-west, and scarcely half of the species are found in other parts of the country. With regard to fish, the Danube district forms a province of the Black Sea faunal district where no salmon are found, although this fish abounds in the rivers flowing to the North Sea and the Baltic. There are numerous oyster banks off the shallow west coast of Schleswig, and the only place in German waters where the lobster lives is near Helgoland.

Forests.—In order to secure a profitable supply of timber, pine and fir woods have recently been extended at the cost of the deciduous forests, which, consisting mainly of oak and beech, now occupy only one-third of the area of German forests. Larch woods are found chiefly in the Alps, and the beautiful Rolle pine (*Pinus cembra*) grows there only. Proud forests of the silver fir (*Edeltanne*) still beautify the Vosges and the Black Forest, and are found in places amongst the hills of Thuringia and on the slopes

of the Sudetes, but they do not occur much further north. The characteristic tree of the Central Highlands is the spruce (*Fichte*), and that of the Northern Plain is the Scots pine (*Kiefer*), which makes up almost half of the German forests, together with the white birch. The beech, which still thrives so splendidly on Rügen and the other Baltic coast lands, is suddenly limited by the climate from Königsberg towards the north-east; beyond this it cannot thrive on account of the increasingly continental climate reducing the period with a mean day temperature of over 50° F. to less than five months, although it stands cold in winter better than the oak. In the north-west, on the contrary, the saltness of the stormy sea winds stunts the growth of trees, and moors and heaths cover that region which is the least wooded in all Germany. Vine-growing is impossible in the north-west on account of the damp air and dull skies, but formerly it was carried on in the sunnier regions of the north-east. Now, however, when better means of transport make it unnecessary to grow sour grapes, the German vineyards are mainly found in the valleys of the Rhine and its tributaries. On the Alpine Foreland, influenced by the raw Alpine climate, the vine cannot be cultivated; in eastern Germany, however, as far north as latitude 53°, the summer and early autumn are warmer and less cloudy than similar latitudes in the west, and the most northerly vineyards in the world are those of Bomst, in the province of Posen, 52° 10′ N.

German Races.—Until the commencement of the Christian era the German tribes only inhabited the north of Germany, not extending to any great distance west of the Rhine. Then they began to displace or subjugate the Keltic people of the southern half of Central Germany and the left bank of the Rhine. In the course of their wanderings the Germans next took possession of the Alpine Foreland and of the Alps. Even to the present day the mixture of Keltic blood in South Germany may be recognised in the large proportion (from 15 to 30 per cent.) of dark-complexioned and dark-eyed people; in North Germany fair complexions predominate, or at the most brown hair with light-coloured eyes, the proportion with dark complexions scarcely ever reaching 15 per cent. When, in the course of their migration, the German people had deserted the greater part of the eastern half of Central Europe, Slavonic tribes, called by the Germans *Wends*, entered from the east and spread over northern Germany to Holstein, the Elbe, and the Thuringian Saale. People of the closely-related *Lithuanian* group, coming from the east, settled themselves in East Prussia from the Vistula to beyond the Memel. They included the *Prussians*, whose language became extinct about the year 1700, the *Letts*, and in the extreme east to beyond the Russian frontier, the *Lithuanians*, who have still preserved their very ancient language, which in many ways resembles Sanscrit. During the second half of the Middle Ages the Germans again took possession of the eastern regions. The Slavs were, however, by no means driven out,

but German colonists settled amongst them, gradually introducing their language and customs. So completely has the process of Germanisation been carried out in the districts settled by the early colonists that in most cases the only sign of the Slavonic origin of the peasantry is to be found in the foreign sound of the place-names, which often end in *itz* and *ow*. The Slavonic peoples of north-eastern Germany related to the Poles have completely adopted the German language since their contact and mixing with that people; but the Slavs related to the Chech family have still preserved the remembrance of their original tongue in the Spree valley between Bautzen and Cottbus. It is only in those parts of the country which belonged to the kingdom of Poland up to the eighteenth century that the population continue to speak Polish generally. The *Poles* are not quite three millions in number, and they live chiefly in the provinces of West Prussia, Posen, and south-eastern Silesia; it is they principally who compose the 8 per cent. of German subjects who speak foreign languages. Next to them come about a quarter of a million *French*-speaking inhabitants, mainly in Lorraine, about half as many *Danish*-speaking in northern Schleswig, and the same number of Lithuanians.

The chief elements of the present German population are :—

(1) *Swabians* from the Vosges mountains to the river Lech and in the Neckar district (the Germans of Switzerland also belong to this family). (2) *Bavarians* in the whole Danube basin east of the Lech (the Germans of the neighbouring parts of Austria are closely related). (3) *Franks of the Main, i.e.*, the Franks who migrated from the North German Rhine district to the Main valley. (4) *Palatines*, a mixed stock of Franks and Swabians in the Bavarian Palatinate, the south of the grand duchy of Hesse, and northern Baden. (5) *Franks of the Rhine*, in the Rhine province and in Nassau. (6) *Hessians* in the highlands of Hesse. (7) *Thuringians* in Thuringia. (8) *Saxons* extending from Westphalia to the Elbe and to Schleswig-Holstein, also called Low Saxons in contradistinction to the formerly-named Low German or Platt-Deutsch-speaking people. (9) *Frisians*, along the coast of the North Sea and the off-lying islands, formerly speaking Frisian, a dialect distinct from all other varieties of German, but now speaking Low Saxon.

Language.—Where Low Saxons colonised the Slavonic lands on the Baltic coasts and in the Mark Brandenburg, Low German became the spoken language. East Prussia, on the other hand, was colonised by the most different races of North and South Germany after the Order of German Knights had conquered the country in the thirteenth century. Thuringians took the chief part in the Germanisation of Saxony; and Thuringians and Hessians in the settling of Silesia; hence in both these lands Upper German is spoken; indeed, the dialect of the kingdom of Saxony (Upper Saxon or Meissnisch) was promoted in the sixteenth century to be the literary language, or "High German." Upper German was derived in the Middle Ages by phonetic change from the Low

German, once the universal German tongue. It spread from the Swabians and Bavarians of the "Upper Lands," who initiated the change, gradually displacing the northern dialects. At the present time Low Saxon only remains unaltered amongst the Frisians, who, to give an example, instead of using the High German *das* and *Wasser*, keep to the old unchanged form of *dat* and *water*, pronounced as in English, and in fact almost identical with the English words *that* and *water*. One of the most remarkable cases is the transitional position of the Franks. The Franks of the Main speak with the Upper German value of the consonants, the Franks of the Rhine Highlands retain some of the old unaltered words, while those in the Lower Rhine Plain near the Netherlands speak the ancient unmodified Frankish dialect.

History.—The territory of the present German Empire (with the exception of the north-eastern provinces, which were added later) formed, together with the remaining States of Central Europe, the East Frankish Empire as it was constituted in 843 out of the Frankish Empire of Charles the Great (Charlemagne). The ancient German Empire, however, has been diminished by the withdrawal of the territories now belonging to Switzerland, Belgium, and the Netherlands. What remained over fell at last into many hundred powerless fragments—temporal and spiritual principalities, free cities, even imperial villages—scarcely held together in a nominal empire. Only two of these practically independent little States attained any real importance. One of these was the Bavarian Mark of the Habsburgs which grew in the Middle Ages into the Austrian Duchy in the south-east; the other was the State of the Hohenzollerns, which spread from the Mark of Brandenburg in the fifteenth century until it occupied, as Prussia, the whole of the north-east of the German Plain.

The power of the great Napoleon brought the old German Empire to an end in 1806, shortly after the spiritual principalities (the domains of the Prince-Bishops) had been suppressed in favour of the claims of the temporal princes. States of the old empire to the number of thirty-nine, but later only thirty-five, again came together in the feeble union of the German Confederation (*Deutsche Bund*) which lasted from 1815 to 1866. This union terminated with the war of 1866, which was really a struggle between Prussia and Austria for the leadership in the Confederation, and led to the definite withdrawal of Austria. Thus the way was prepared for the new German Empire, under the leadership of Prussia, which was founded after the united forces of the German States defeated the French attack in 1870.

FIG. 139.—*The German Imperial Standard.*

Government.—The present German Empire is a strong Confederation of twenty-six sovereign States, each possessing its own independent form of government, but, for the common affairs of the empire, all subordinate to the central government.

This government consists of — (1) the Federal Council (*Bundesrath*) composed of 58 members representing the constituent States of the empire; (2) the Imperial Diet (*Reichstag*), a popular assembly elected directly by the votes of the whole German people; (3) the Ministers appointed by the German Emperor, who, by the constitution of the empire, must be the King of Prussia for the time being. The Emperor is Federal Commander-in-Chief and supreme head of the whole imperial administration; but he is not the monarch of Germany—the authority he exercises is vested in him "in the name of the confederated governments."

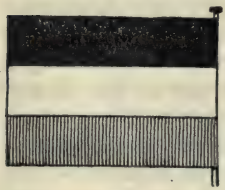

FIG. 140.—*The German Flag.*

Division.—In size Germany is the third, in population the second country of Europe. The constituent States may be distinguished into North German and South German, as the course of their development was affected by one or the other of the great commercial areas of central Europe—the northern depending on maritime trade, the southern on trade over the Alps or by the Danube. South Germany consists of *Bavaria*, *Württemberg*, *Baden*, the Reichsland of *Alsace-Lorraine* (administered directly by the empire through a Statthalter, or governor) and the southern part of the grand duchy of *Hesse*, which is not inhabited by Hessians, but came under the duchy by inheritance. *Prussia* occupies the lion's share of North Germany, although the growth of this State towards the west did not begin until 1609, and until 1866 included only the provinces of Rhineland and Westphalia in the west. By the acquisition of Hanover, the Electorate of Hesse and Nassau, including Frankfort-on-the-Main, Prussia was able to unite its older provinces of the east with the hitherto isolated provinces in the west, and so to command a stretch of territory extending from the Belgian to the Russian frontiers; and, with the exception of the Free Towns, *Hamburg*, *Bremen*, and *Lübeck*, left only three other States to share the German coast—viz., the two grand duchies of *Mecklenburg*, and *Oldenburg*. The only North German State besides Prussia which is large enough to contain several million inhabitants is the kingdom of *Saxony* lying close up to the Bohemian border. The fact that North Germany, particularly in Thuringia and in the Weser district, contains no less than twenty of the constituent States of the empire, shows that the northern States have been able to maintain their separate existence better than those in the south.

Religion.—Germany, the cradle of the Reformation, where the strife between Protestants and Roman Catholics first broke out, has continued to be a land of mixed confessions—63 per cent. of the people are Protestant, 36 per cent. Roman Catholic, and 1 per cent. are Jews. Their distribution can be clearly explained by historical considerations. Parts of West Prussia, Posen, and southern Silesia form the eastern belt of predominating Catholicism in the Oder and Vistula region, the people having

belonged to Roman Catholic Poland. Beyond this East Prussia is Protestant, because the Grand Master of the Order of Knights, the Hohenzollern Albrecht, who became Duke, took up the cause of the Reformation. The broad middle district of the German Empire is almost throughout Protestant, but in the south-west a strip of Catholic country stretches from Bavaria to the old district of the Bishops of Münster on the Ems; here one can see to this day the effect of the religious peace of Augsburg in 1555 when the dictum was published—*Cujus regio, ejus religio.* Thus where, in those days, the Prince-Bishops ruled on the Rhine, the Mosel, and the Main, and as far as Westphalia, or where the Bavarian Wittelsbacher remained true to the old beliefs, the Catholic ritual is followed to the present day; but in old Württemberg on the Neckar, in the Palatinate, and in Hesse, the Protestant form of worship prevails, because there the princes took up the cause of the Reformation in the sixteenth century. The distribution of the half-million Jews who inhabit Germany may also be explained historically, although in this case social conditions have also to be taken into account. They are confined principally to the districts on the east where there is a large Polish population, and to the south-west in Hesse, the Palatinate, and Swabia; Bavaria contains the smallest number of Jews. The larger number of Jews in Alsace compared with Baden is accounted for by the more favourable laws in the former State during the French period.

The German People.—The density of population is to be explained by economic rather than historic considerations. The average density of population throughout Germany is 250 to the square mile, a figure which is only exceeded amongst the large countries of Europe by Italy and the United Kingdom. The agricultural districts, especially in the Alpine Foreland, the sandy North German plain, and the poor rocky soil of many parts of the Rhine Highlands, of course are much less densely peopled. Yet along the whole course of the Rhine the density of population reaches 250 per square mile, and wherever minerals, especially coal, give rise to flourishing industries, the density approaches 400. This is the case in south-eastern Silesia and on the Waldenburger coal-field to the south-west of Breslau, in the kingdom of Saxony, and especially in the Lower Rhine and Westphalian manufacturing district. With the exception of the Free Towns, Hamburg and Bremen, the most densely peopled State in the world is the kingdom of Saxony with an average density of 658 per square mile, thus surpassing even Belgium.

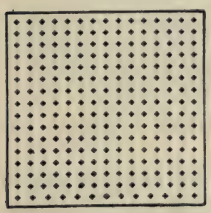

FIG. 141.—*Average population of a square mile of Germany.*

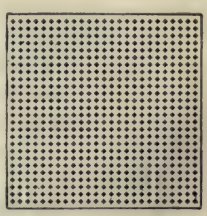

FIG. 142.—*Average population of a square mile of Saxony.*

The German people must be perseveringly laborious, frugal, and thrifty in order to make a living out of the soil of their country, which, although nowhere too rich, everywhere yields a fair return for hard work. The large families of the Germans present a curious contrast to those of other nations, especially of the French. Since 1871, for example, the natural increase of population in Germany has been over 11 million, and in France only 2 million. The result is considerable emigration from Germany to distant lands, especially to the United States and British Colonies, where Germans prosper and make good citizens.

The German is not so quick and versatile as the people of the warmer countries of the south, but his inclement winters have given him a regard for the domestic hearth, fostered the family sentiment, encouraged a depth of feeling, and habits of contemplation, led to a love for reading and thinking, and to the cultivation of science. Compulsory attendance at school and, since 1871, the service in the army of every able-bodied young man, have exercised a most salutary influence on the intellectual and physical life of the nation. Without being particularly rich, Germany is ready to make great sacrifices in order to maintain the army and navy in a condition of high excellence for the protection of its recently-won position amongst the armed Powers of Europe.

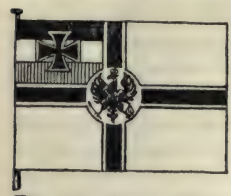

FIG. 143.—*German Naval Ensign.*

Agriculture.—Until the middle of the nineteenth century the German lands were almost exclusively of agricultural value. This is now the case with the north-east only, and even there many centres of manufacturing industry are springing up; and these industries are the most important interests in the west. Taken as a whole 42 per cent. of the people of the German Empire are dependent on agriculture, 33 per cent. on manufacturing industries, 8 per cent. on trade, and 3 per cent. on mining and the extraction of metals.

The map (Fig. 144) shows the distribution of the more important branches of agriculture and related industries. The favourable climatic conditions of the south-western districts naturally fit them for the extensive growth of the vine, hops, and tobacco, and make the Upper Rhine plain almost the only part of the country where wheat and barley predominate among the crops. In all other places rye and oats, the chief grain crops of Germany, take the first place. With respect to its total production of all grain-crops Germany is hardly excelled by the more favoured fields of France, and Russia alone amongst the nations of Europe has a much greater production. But it must be remembered that the warm air and less sandy soil of France allow far more wheat to be grown there, and that the German peasants must, to a large extent, content themselves with black bread made from rye. The potato was naturalised in all parts of Germany in the eighteenth century; it supplies a cheap form of food, the more valu-

able because, like rye, it flourishes on a light soil and in a raw climate. Germany grows more potatoes than any other country, and provides a considerable surplus for export. In the north-east of Germany there are many distilleries for the manufacture of spirits from potatoes; and thus great estates dating from the German conquests in feudal times, hitherto nearly useless on account of the sandy soil, have enormously increased in value. More recently this north-eastern region has become the centre of beet-growing mainly in connection with the manufacture of sugar, but partly also for distilling. The excessive drinking of spirits which formerly exercised a

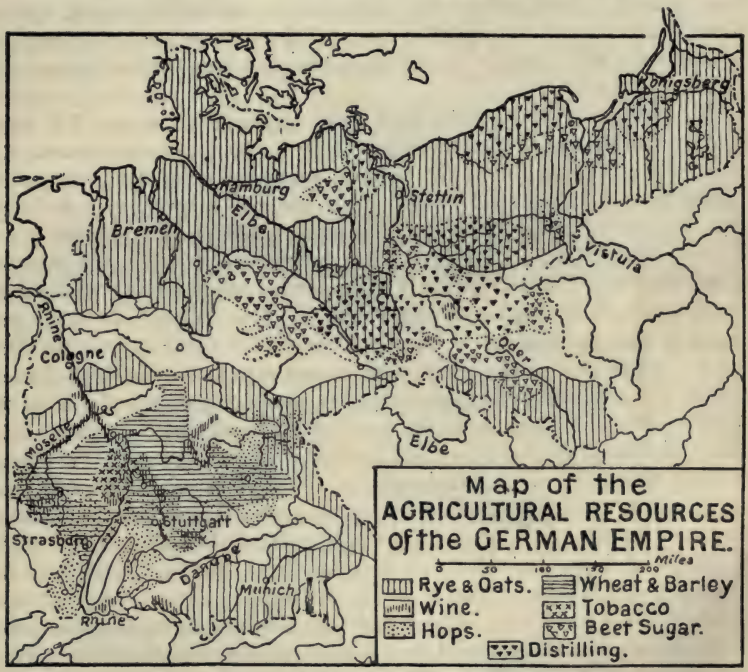

FIG. 144.—*Agricultural Map of Germany.*

bad effect on the lower classes in the wineless country of the eastern Elbe is now being remedied by the establishment in all parts of Germany of breweries producing light beer like that of Bavaria. In the excellence and quantity of the beer it produces Bavaria keeps the first place.

The raising of live stock on the extensive pastures and well-cared-for meadows is an important branch of German farming, and Russia alone has a larger number of cattle in Europe. The plains of the Alpine Foreland and of the north are the best for horse-breeding; cattle are kept everywhere for beef and for dairy purposes from the coast marshes to the Alps. The high farming now practised and the fall in the price of wool due to

imports from abroad have recently led to a considerable reduction in the number of sheep kept. There are in fact more cattle than sheep in Germany, and large flocks are now only to be found on the estates of the great proprietors in the north-east. Goats also are less numerous than formerly; they are kept in the mountains for their milk, where they have earned the name of "the poor man's cow." The number of swine kept, on the other hand, has increased, mainly on account of the development of the beet-sugar industry, the refuse from the factories making good food for pigs.

The Fisheries along the coasts of the North Sea and the Baltic have been greatly stimulated by the extension of railways opening up the inland markets, and a society for artificial fish-culture is actively engaged in increasing the number of the more valuable fresh-water fish such as trout and salmon.

Industry.—The Germans have been foremost in mining for many centuries, and German miners are now to be found in every continent. On many of the mountains of the country, particularly the Erzgebirge, the diminution of the output of ore from the old mines has led to the development of many forms of domestic industry through the efforts of the people to make a living on their native soil. Yet the methods of working and the enterprise of the German miners have brought all processes to a high degree of excellence. Almost half of the silver produced in Europe is raised in Germany, most of it from silver-lead ores; and the production of zinc, lead, and copper is equally advanced. These metals are obtained principally from the mountains of Prussia, from the neighbourhood of Aachen in the west to upper Silesia in the east. The most valuable of the Earth's riches, however, are the supplies of iron-ore, found in almost all parts of Germany, and coal. The most important coal-fields, which as a rule abound in iron-ore also, occur on the northern border of the Rhine Highlands especially in the Ruhr valley, in the neighbourhood of Aachen, to which the Belgian coal-field extends, south of the Hunsrück on the Saar, in Saxony, in Silesia near Waldenburg, and in Upper Silesia. In the production of coal and iron Germany is far ahead of every other country on the continent, and is only surpassed by the United Kingdom amongst European States (Fig. 70). It is besides very rich in rock-salt, and in potassium salts of enormous industrial importance, which accompany the common salt. Almost all the salt-bearing formations are found in the sunken mountains under the diluvium covering the North German plain; and there a vast supply is stored up for the future.

Brewing, spinning, and weaving were old domestic industries, and wood-carving is a national occupation of great antiquity. Domestic industries have developed on the higher slopes of the mountains where agriculture becomes less profitable; there the weaving of wool and flax were early favoured by the mountain climate, and wood-carving, lace-making, and, later, glass and porcelain manufacture were established. During the nineteenth century the introduction of factories and steam-power has swept

away many of the old village workshops, but has brought more lucrative employment to large numbers of working men and women. The most developed of these are the textile industries, now including cotton and silk as well as wool, and the manufacture of iron where the ore and coal are mined together, or can be brought to the same place by steam and railway at small cost. The iron trade alone occupies nearly a quarter of a million of workmen. By the quantity and excellence of its manufactures Germany has rapidly distanced all other countries on the continent in the markets of the world, and takes rank next to the United Kingdom. An index of the rapidity of the growth of great industries is afforded by the increasingly rapid migration of people from the country to the towns, and from the small towns to the larger cities. Thus in 1871 there were 8 German towns of over 100,000 inhabitants, together making up rather less than 5 per cent. of the population of the empire ; in 1891 there were 26 of these towns with 12 per cent. of the population, and in 1895 there were 28 with 14 per cent.

Trade.—The external trade of Germany amounts to about $2,000,000,000 per annum, or $40 per head of the population (see Fig. 71). It is that of a typical industrial State, the exports consisting mainly of manufactured articles and the imports of food and raw materials, the proportions being :—

	Food Material.	Animals.	Raw Materials.	Manufactures.	Total.
Imports.. ..	28·4	6·6	58·7	6·3	100·0
Exports.. ..	9·2	—	19·1	71·7	100·0

The principal trade is done with the United Kingdom, then follow the United States, Austria-Hungary, and Russia. The two last-named countries are important for the supply of grain, for Germany itself, even in years of good harvest, does not produce enough food for the population which increases by half a million. The importance of the United States, on the other hand, is mainly for the supply of raw cotton.

The over-sea trade of Germany is carried on by means of a merchant fleet, only second in tonnage to that of the United Kingdom amongst European States. Since 1895 the Kaiser Wilhelm Canal, through Holstein from the Baltic to the estuary of the Elbe, has stimulated German trade by opening a shorter route from the Baltic ports to the Atlantic.

Internal Communications.—The navigable waterways of Germany measure nearly 7,500 miles, of which 1,500 miles are canals. The Rhine is the most important of the navigable rivers ; the Elbe, Oder, and Vistula come next in order. South Germany is poorly supplied with water transport as the Rhine above Mannheim is too rapid for easy navigation, and the Bavarian Danube is not much wider than the Ems ; hence the railways carry most of the traffic between North and South Germany.

The German Empire has the greatest railway system in the world, with the exception of Russia and the United States. There are 29,600 miles of railway, and there is scarcely a point in the empire which cannot be reached within twenty-four hours from Berlin. The capital sunk in these railways is $2,600,000,000 ; and the railways are of more than national im-

portance. The lines along both banks of the Rhine have formed an important link in the communication between England and India since the St. Gothard tunnel was opened; the line from Strassburg through Munich to Vienna is traversed by the Orient Express from Paris to Constantinople, while the line from Cologne through Berlin to Warsaw unites Paris by the town of Samara on the Volga to Siberia, and thus to the whole of eastern Asia. The central position of Berlin in the railway system of Europe is clearly shown in Fig. 54.

Districts and Towns of the Alpine Foreland.—The German share of the Alpine Foreland which stretches from the Lake of Constance to the Inn, is crossed by the rivers Iller and Lech flowing towards the north and the Isar and Inn towards the north-east, but these rivers are so rapid that they are only available for floating rafts. The Alpine Foreland is prolonged on the north bank of the Danube towards the Fichtelgebirge in the Upper Palatinate, which stretches between the Franconian Jura and the Bohemian Forest, and is drained by the south-flowing Naab. In the Bavarian Alps and the neighbouring parts of the Foreland coniferous forests and pastures predominate, and the people are principally engaged in cattle-rearing. Towards the Danube, however, agriculture prevails, and the wooden cottages with shingle roofs adapted to an Alpine climate give place to tiled farm-houses. The western or Swabian end of the Foreland belongs to the kingdom of Württemberg as far as the Iller; and at the point where that river enters the Danube at the commencement of navigation, the city of *Ulm* stands on the left bank. It is renowned for its splendid cathedral, and is besides an ancient commercial town at the end of the most convenient passage between the Danube valley through the Franconian Jura to an eastern tributary of the Neckar. Between the Iller and Lech lies the Swabian district of the kingdom of Bavaria. *Augsburg*, the former chief town of the Alpine Foreland, stands on the Lech. It dates from Roman times, and remained a very important commercial centre until the fifteenth century, on account of the Oriental goods brought over the Alpine passes from Italy and down the Lech valley. The road forked at Augsburg westward to Ulm and northward through the Franconian Jura. The eastern portion of the Foreland is the original country of **Bavaria**, which became a kingdom in 1806 and secured as an extension the Swabian district as well as the three districts of Franconia in the basin of the Main.

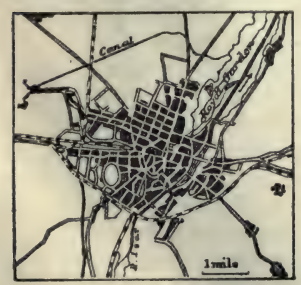

FIG. 145.—*Munich.*

Munich (*München*), on the Isar, has grown up since the thirteenth century, and succeeded Augsburg as the royal residence. The kings have beautified the city by the erection of many fine buildings, and made it the centre of South German art, especially painting,

and of art industries. It is the greatest beer-brewing town in the world, and the chief grain market for the non-agricultural region of the Bavarian plateau and the Bavarian Alps ; but, above all, it has a great future as a commercial centre on account of the railways converging to it from the north, from the south over the Brenner Pass and down the Inn valley, from Paris on the west and Vienna on the east. The lack of coal in the Alpine Foreland has restricted manufactures. *Regensburg* (*Ratisbon*), the old residence of the Dukes of Bavaria, stands on the Danube at the most northerly point reached by that river, where in the early Middle Ages the incoming Bavarians first encountered it as they came from Bohemia, and where in antiquity the Romans erected a fort against the independent German tribes.

South-West German Districts and Towns.—"The Garden of Germany" is the name fondly given to the rich, flat plain of the Upper Rhine, aglow with varied agriculture, and framed by the finely wooded ranges of the Vosges and Black Forest. Behind these bordering ranges of ancient rock there follow stretches of Triassic and Jurassic formations. The eastern flank of the system belongs entirely to Germany, and includes the Swabian-Franconian Jura, a limestone plateau with an abrupt slope downwards on the side towards the Rhine, crowned by prominent castles, such as those of Hohenzollern and Hohenstaufen, and merging into the Swabian-Franconian terrace region through which the Main and Neckar flow. The western flank extends into France ; here the boundary strips exhibit a striking section where, on the right of the Mosel in German Lorraine, the Jurassic rocks remain above the Triassic.

The Rhine receives almost all the streams of the south-west German basin ; the Neckar and Main, the chief rivers of the eastern flank, have cut their way through the Central Highlands to the middle Rhine plain, and on the western flank the Mosel, flowing from the southern Vosges like a twin of the Neckar, describes a wide arc and returns to the Rhine through the gorges of the Rhine Highlands.

Until the South German States extended their territory under Napoleon's influence the State of **Württemberg** was confined to the Swabian portion of the Neckar basin. It became a kingdom at the same time as Bavaria, and its capital, *Stuttgart*, has recently acquired considerable importance. It is situated amidst charming scenery on the left side of the Neckar, and prospers on account of the cheap transport of raw materials and coal by the Neckar valley railway from the Rhine, enabling it to become an industrial centre particularly for engine-construction and cotton-weaving. It is also the chief centre of the South German printing and publishing trade. In Bavarian Franconia two ancient episcopal cities stand in the valley of the Main, the only large river in Germany which flows westward. These are *Bamberg*, on the Rednitz close to its confluence with the Main, and *Wurzburg*, a larger town on the Main itself where the river cuts its zigzag course almost in the

shape of a **W** into the Muschelkalk of the Triassic Franconian plateau. *Nürnberg* (*Nuremberg*), on the Pegnitz, an eastern tributary of the Rednitz, is nearly twice as large. It was founded in the eleventh century on barren ground under the protection of an imperial castle ; then, through the energy of its citizens, it acquired the rank of a self-governing "Free Imperial Town," and became the most famous centre of industry and invention in Germany during the Middle Ages. Now it has again become a busy industrial town, and a great centre of commerce on the railway which runs through it directly northwards from Augsburg to Erfurt. Nürnberg is a gem among the towns of Germany on account of the perfection in which its ancient buildings have been preserved, and especially for its noble Gothic churches.

Frankfort-on-the-Main is on the threshold of North Germany, and has grown into the greatest of all the towns of the Main valley. Like Vienna it stands on a point where two routes cross at right angles ; the east to west route following the Main valley being cut by the north to south route from the Upper Rhine plain to the north coast. It was the true centre of the earliest development of German culture in the Rhine valley, and in many respects the chief town of the old German Empire. It has always been a place of civic affairs, and of high intellectual activity —it is the birthplace of Goethe. Since 1866 it has been attached to the new Prussian province of Hesse-Nassau, and now, by the deepening of the lower channel of the Main, Frankfort is practically one of the Rhine river-ports, and one of the foremost trading and banking centres of the west of Germany. The southern part of **Hesse,** formerly belonging to the Electoral Palatinate, contains *Darmstadt,* the capital of the grand duchy, at the base of the Odenwald, and *Mainz* (*Mayence*), a fortress on the bend of the Rhine towards the north-west and the most important crossing-place of the Middle Rhine. The Bavarian Palatinate lies entirely on the left of the Rhine, enriched by the generous vineyards of the eastern slope of the Hardt. Finally, the northern portion of the grand duchy of **Baden** contains *Heidelberg* at the point where the Neckar enters the plain ; this old capital of the Elector Palatine is dominated by the magnificent ruins of an ancient castle destroyed by the French in 1689. The later capital, *Mannheim,* is an entirely modern town at the confluence of the Neckar and the Rhine, and carrying on an active trade on the great river. The present boundaries of Baden date only from the nineteenth century. The capital, *Carlsruhe,* was built in 1715 at the command of the Prince round a hunting castle, from which, as a centre, the straight main streets radiate. *Konstanz* (*Constantia, Constance*), on the other hand, has been a town since the time of the Romans, and was an episcopal city in

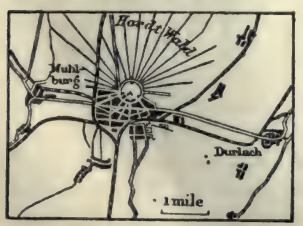

FIG. 146.—*Carlsruhe.*

the Middle Ages; it is the only town of Baden on the left bank of the Rhine, being situated at the point where the Untersee unites with the Lake of Constance.

The imperial territory of **Alsace-Lorraine,** re-taken from the French in 1870, is made up of Alsace on the slopes of the Vosges draining directly into the Rhine, and Lorraine in the Mosel district; the former is inhabited by people of Swabian and the latter of Rhenish-Franconian stock so far as they were not occupied by the later immigration of Romanised Kelts. *Strassburg,* the capital of Alsace-Lorraine, is a very important traffic-centre and a strong fortress, because it lies almost in a straight line between the valley of the Zorn by which the route from Paris crosses the Vosges, and the valley of the Kinzig which leads across the Black Forest to the source of the Danube (see Fig. 48). *Mühlhausen,* in the south of Alsace, is the most important cotton manufacturing town of southern Germany. The strong fortress of *Metz* protects the Mosel valley, which forms the most natural line of communication between France and Germany. It was the ancient capital of the Keltic Mediomatriker.

The Rhine Highlands and their Towns.—This division of the country presents an undulating surface little over 1,500 feet above sea-level, forming the worn-down residue of a mountain range now presenting a reniform outline, the indentation being represented by the low plain of Cologne towards the north-west. The Rhine flows across this plateau in a gorge towards the north-west, which is most contracted between Bingen to the small volcanic mountain group of the Siebengebirge opposite Bonn The eastern wing of the Slate Highlands is divided by the Mosel valley into the Hunsrück on the south and the Eifel on the north; the right wing is called the Taunus as far as the Lahn, the Westerwald as far as the Sieg, the Sauerland as far as the Ruhr, and the Haar to the north of that river. The plateaux between those valleys of the Rhine system have for the most part an inclement climate and infertile soil; in the Eifel there are extensive moorlands on account of the amount of clay present forming an impervious soil; other parts bear extensive forests. The deeply cut valleys, on the contrary, are extremely fertile because of their sheltered position and productive alluvial or loess soil. Here in the Rheingau at the base of the Taunus and on the slopes of the steep slate banks of the Rhine and Mosel, frequently crowned by the ruins of ancient castles, the best wines of Germany are grown. Here also, close to the thinly peopled plateaux untouched by trade, is one of the most thickly peopled and busiest districts of the country, the river itself traversed by a ceaseless stream of passenger and cargo steamers, and railways following both banks through the gorges. The pulse of traffic beats less strongly in the lateral valleys, but recently a railway of great importance for strategic purposes has been constructed along the valleys of the Lahn and Mosel connecting Metz with Berlin. The whole is now Prussian, the greater part being included in the Rhine Province inhabited by people of the

Rhenish-Franconian stock ; only the Taunus and the Rheingau belong to the new province of Hesse-Nassau, and the north-east of Sauerland (the Ruhr district) to the Low Saxon province of Westphalia. On the left side of the Rhine, once occupied by the Romans, there are towns whose history goes back for more than a thousand years. *Trier* (*Trèves*) was once the chief town of the Keltic Treverer ; it stands in a widening of the Mosel valley and was often the residence of the Roman emperors, who made it an outpost against the attacks of the German tribes.

Other ancient towns are *Bingen*, the university city of *Bonn*, and right in the centre of the Slate Highlands *Coblentz* (*i.e.*, *Confluence*), at the mouth of the Mosel, the capital of the Rhine province, and strongly fortified in order to protect the valley of the Rhine from an attack by way of the Mosel. *Aachen* (*Aix-la-Chapelle*), at the northern base of the Eifel, stands on a coal and iron field, the only great industrial town of Germany, which is at the same time celebrated for its baths, its warm springs having in fact given it its name from the Latin *Aquæ*. The charming bathing-place of *Wiesbaden*, in a sheltered spot at the base of the Taunus, has also been celebrated for its baths since Roman times.

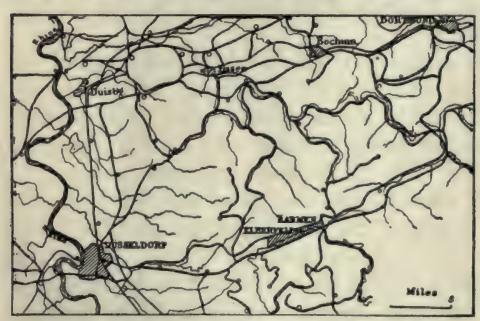

FIG. 147.—*The Railways of the Ruhr Coal-field.*

Thanks to the metal production, and principally to the iron of Sauerland and the neighbourhood of the Ruhr coal-field, a close swarm of industrial towns has grown up, including on and near the Wupper, the contiguous towns of *Elberfeld* and *Barmen*, engaged in textile industries ; *Solingen* and *Remscheid*, with iron and steel manufactures ; and north of the Ruhr valley, *Essen*, with Krupp's famous cast steel works, and further east *Dortmund*, a centre of iron and coal mining on the edge of the Haar and the seat of a great iron industry, particularly the construction of machinery.

The Hessian Uplands.—The narrow Hesse and Weser Uplands lying east of the Rhine Highlands, are unified by the Weser river system but fall naturally into two divisions. That of Hesse to the south is higher, with masses of hard basalt standing out from the prevailing Triassic rocks and forming the highest parts of the district in the Vogelsberg (2,533 feet) and the Rhön mountain (3,146 feet). The river Fulda rises in the Rhön, and unites at Münden (*i.e.*, mouth, called after the confluence) with the Weser, which flows from the south-western slope of the Thüringerwald, and is called as far as Münden by the Upper German dialect name of Werra. The Eder flows east to the Fulda from the slopes

of the Rhine Highlands, and the Diemel north-east to the Weser below Münden. Being without mineral wealth Hesse has perforce developed as a purely agricultural district; until the thirteenth century it could only boast of small villages, and even yet there are scarcely any but small market towns. The two famous mediæval abbey-towns of *Fulda* and *Hersfeld* stand on the Fulda; and lower down the same river *Kassel*, the capital of the Prussian province of Hesse-Nassau, is built on a fertile expansion of the valley, an important meeting-place of traffic from the north and south, and from Thuringia on the east. The flat dome-like mass of the Vogelsberg, together with the fruit-growing plain of the Wetterau stretching from the bed of the Lahn at Giessen to Frankfort-on-the-Main, forms the North German half of the grand duchy of Hesse. The Principality of **Waldeck** stretches from the Eder to the Diemel west of Kassel.

The Weser Uplands.—The varied scenery of the Weser Uplands, scarcely any parts of which exceed 1,500 feet in elevation, is formed almost entirely of Mesozoic sedimentary rocks. It consists mainly of fairly abrupt and finely wooded hills which pleasantly break the monotony of the flat fields and meadows on either side of the Weser. In the north there are two long narrow mountain ridges, the Teutoburger Wald and the Weser chain converging towards it and cut through by the Weser in the *Porta Westfalica*. There is no natural centre for the growth of a town, but the Low Saxon people have always combined their farming with other work, particularly with weaving, and recently the utilisation of supplies of coal, both of Carboniferous and of Cretaceous age, has led to an advance in industrial enterprise. *Bielefeld*, renowned from an early period for the fine linen it produces, is in the Prussian province of Westphalia, at a remarkable gap in the Teutoburger Wald which gives passage to the railway from Cologne to Minden. Most of the rest of this region belongs to the Prussian province of Hanover. The university town of *Göttingen*, in the south, stands on the Leine, which flows out of Thuringia, and runs parallel to the Weser, reaching the northern plain before it joins the Aller, a tributary of the Weser. In the north of the province of Hanover there are two interesting old episcopal cities: *Hildesheim*, on the Innerste, which flows from the Hartz plateau to the Leine, a town whose quaint architecture has won for it the name of "the North German Nürnberg," and *Osnabrück* lying between the converging spurs of the Weser chain and Teutoburger Wald in the west, now the seat of varied industries in consequence of the recent discovery of coal. The two parts of the province of Hanover are almost completely separated by a series of small States running east and west, including the principality of **Lippe** between the Weser and the Teutoburger Wald, with its capital *Detmold;* and a narrow strip of the territory of Brunswick (*Braunschweig*) from the Weser to the Hartz, and north-east of the *Porta Westfalica*, the principality of **Schaumburg-Lippe,** one of the smallest States in Germany.

Thuringia and the Hartz.—The Thuringian basin lies between the elliptical plateau of the Hartz on the north and the Thüringerwald which runs north-westward as a mountain ridge from the plateau of the Frankenwald dominated by the Fichtelgebirge. It is a comparatively low district of Triassic formation covered in great part by cultivated fields, contrasting with the bare ancient rocks and old forests of the bordering highlands which rise in places to over 3,000 feet (the Brocken 3,740 feet) in elevation, too high for profitable agriculture. The Hartz contains great mineral wealth, its mines yielding large quantities of iron, lead, silver, and copper ore ; while the Thüringerwald and Frankenwald are noted for the variety of their industries, amongst which the manufacture of glass and porcelain and wood-carving are pre-eminent. In the Thuringian basin also there is a good deal of small industry, although with the exception of salt there are no useful minerals, and farming is the chief occupation of the people. Northern Thuringia and part of the Hartz, including the Brocken, belong to the Prussian province of Saxony. *Erfurt*, the metropolis of Thuringia, is an important traffic centre on the east-and-west artery of trade formed by the Thuringian railway between Eisenach and Halle. *Halle-a-S.* (*i.e.*, Halle on the Saale, the river which rises in the Fichtelgebirge and receives on the left the chief Thuringian stream, the Unstrutt) has recently outstripped Erfurt in the growth of population on account of its fine commercial situation in the south-eastern "bay" of the North German plain, and to the promotion of manufactures on a large scale by the presence in the neighbourhood of large deposits of Tertiary lignite. On account of the frequent divisions of inheritance amongst the branches of the Saxon Ernestine family, the south of Thuringia forms a mosaic of small States, which are grouped into about a dozen areas scattered over the district. The grand duchy of **Weimar** is made up of two parts, one containing *Weimar* to the east of Erfurt, the other *Eisenach* with the old castle of the Wartburg, celebrated throughout the world for its associations with Luther, finely situated at the north-western end of the Thüringerwald. **Coburg-Gotha** is a double State made up of two separate parts—the Thuringian duchy surrounding *Gotha*, between Eisenach and Erfurt, and the Franconian duchy, containing *Coburg*, in the drainage area of the Main. **Meiningen** stretches from the Werra valley, in which its capital *Meiningen* stands, to the Frankenwald, where *Sonnenberg* is the greatest doll-making town in the world, and as far as the upper Saale. **Altenburg** shares part of the Saale valley near the borders of Meiningen, and a separate portion farther east where the capital *Altenburg* is situated, near the Pleisse to the south of Leipzig. There are two other pairs of little States not of the Ernestine group, but also made up of scattered bits of territory, **Schwarzburg-Rudolstadt** with *Rudolstadt* on the Saale, where the beautiful Schwartzathal opens ; **Schwarzburg-Sondershausen** with *Sondershausen*, entirely surrounded by Prussian territory to the north of Erfurt ; **Reuss** of the older line, with *Greiz* on the

Elster, and **Reuss** of the younger line, with the industrial town of *Gera* further down the same river.

The Kingdom of Saxony.—The kingdom of Saxony with the outline of a right-angled triangle, lies close to the east of Thuringia. The Erzgebirge which rise steeply from Bohemia sink gradually in the form of a plateau towards the north-west on the Saxon side, down which the two Mulde rivers flow to unite on the fertile loess-covered plain and pass onwards to the Elbe. The highest summit of the Erzgebirge, which run north-eastwards from the Fichtelgebirge, is the Keilberg, 4,052 feet. The granitic plateau of Leusitz lies at the eastern angle of Saxony in the line of the south-east running Sudetes. Between these ranges the Elbe breaks through from Bohemia, and with its tributaries has cut up a plateau of Cretaceous sandstone into a series of miniature table-topped mountains of great picturesqueness, which have been termed the Bohemian-Saxon Switzerland. The Elbe, a navigable river before it leaves Bohemia, flows in a north-westerly direction across the fertile and in some parts vine-clad Saxon lands. The capital, *Dresden*, stands on both sides of the river in a beautiful expansion of the valley. Its collected art treasures and fine architecture have won for it the name of "the Florence of the Elbe"; but it has recently become a great industrial and commercial town as well. The somewhat more populous city of *Leipzig*, at the confluence of the Elster and the Pleisse, stands at the north-western angle of the kingdom, its position in the south-western "bay" of the North German plain corresponding to that of Halle. Hence it is the natural objective for warlike movements or peaceful commerce coming from the north-east and keeping as long as possible on the plain, or coming from the south-west with the design of reaching the low ground as rapidly as possible. Thus, next to Berlin, Leipzig is the most important inland trade centre of Germany, and consequently it has become a great industrial town also. It is the chief seat of the German book trade. The most productive coal basin of Saxony stretches over the Mulde district between the great manufacturing towns of *Zwickau* and *Chemnitz*. On the poor, forest-clad soil of the Erzgebirge, the inhabitants, like those of the Thüringerwald, maintain themselves by a variety of domestic industries such as lace-making, and through their diligence and frugality have attained a greater density of population than the agricultural people of the fruit-bearing lands along the northern border.

The Sudetes.—The Sudetic mountain system is composed of mountain ridges and plateaux of Hercynian strike. It separates the drainage areas of the Bohemian Elbe and the Moravian March from that of the Oder, which flows through the "Moravian Gate" (a gap less than 1,000 feet in elevation between the Sudetes and the Carpathians) in a curve towards North Germany, and receives on its course north-westwards through Silesia tributaries flowing north-eastward from the eastern Sudetes and those flowing northward from the western end of the range.

The range runs next rather to the east-south-east, the Lausitzer mountains, from the edge of the plateau towards Bohemia, and on the other side of the deep valley of the upper Neossa come the Iser mountains and their immediate continuation, the Riesengebirge, at the east end of which, not far from Schneekoppe, the most important and central pass of the Sudetes leads from Landshut in the Silesian Bober valley to Bohemia. Finally it follows the irregularly grouped Waldenburger hills and the two closely approaching terminal members of the whole system with a due south-easterly direction, enclosing the rectangular mountain basin of Glatz out of which the Neisse flows north-eastwards through a deep and narrow gorge, and the similarly formed but wider plateau-like depression which gives birth to the Oder. Many of the summits of the Riesengebirge exceed 5,000 feet, and the Altvater in the Gesenke reaches 4,890 feet, heights not found elsewhere in Germany except in the Alps. The whole crest of the Riesengebirge, averaging 4,250 feet in height, rises above the forest limit and is covered only with bushy mountain pine. The high-stemmed coniferous forests belong as a rule to the upper mountain slopes, and are mixed with deciduous trees lower down. The hot summers of eastern Europe allow of agriculture being practised up to 3,000 feet, and the juicy mountain pastures are favourable for cattle-rearing ; on the Riesengebirge the Alpine method of cattle farming prevails, and formerly large flocks of sheep were kept. The wool produced on the spot and the excellent mountain flax supply the materials for an active domestic weaving industry which has been long established ; and recently textile factories, including those for cotton, have developed, and are supported by the charcoal made in the forests. The abundance of timber and the rapid currents of the mountain streams have led to the establishment of many saw-mills, and glass-making has also been introduced from Bohemia. Thus the whole of this mountain region is thickly peopled, but although the villages of weavers stretch for miles along the valleys there are no large towns. Since the three Silesian wars of Frederick the Great almost the half of the Sudetes have belonged to Prussia, and with the plain of the Oder forms the province of Silesia (*Schlesien*).

The North German Low Plain.—The north of Germany is characterised by open plains with, at most, an undulating surface, and is divided up by the numerous streams and rivers which have frequently cut steep-sided valleys through the gently swelling elevations. The most charming features of the landscape in the plain are the small lakes with their fringe of reeds and the white and yellow water-lilies mirrored in the placid surface. These are most numerous on the Baltic ridge and south of it in Brandenburg ; in Posen they disappear as the base of the mountains is approached, but there fertile stretches of loess are mixed with the otherwise sandy soil, and pine forests take the place of the deciduous woods, while wheat, barley, and sugar-beet are cultivated. Deciduous forests, however, do not entirely fail to grace the other

regions; Oldenburg itself boasts some fine oak woods, and the most westerly coast lands of the Baltic rejoice in magnificent beech forests. The sandier the soil grows towards the east the more monotonous do its pine woods become, relieved only by the silvery bark of the birch. About one-third of the surface is covered by such woods, the rest being occupied by sheep pastures and fields of rye, oats and potatoes. The Luneburg Heath extending west from the Elbe to the Aller, is covered with heather and now has many oases of tree plantations. Beyond it the scenery becomes more and more like that of the neighbouring country of Holland, quite flat and sterile, with wide moors on account of the lack of natural drainage; the smell of peat fills the air, windmills are prominent features, and the Frisian cattle graze on the rich marsh meadows behind the protecting sea-walls on the North Sea coast. Remains of the row of North Sea dunes are only to be found along the former coast line of the Continent long since worn away and represented only by the line of Frisian islands, while sand-dunes run along the Baltic coast in place of marsh lands. The only rocky island in the North Sea belonging to Germany is the sandstone islet of Helgoland, lying off the mouth of the Elbe, which was held as a British possession from 1807 to 1890.

Political Divisions of the Plain.—The North German low plain is politically much more homogeneous than the rest of the empire. Besides the three Free Towns—Lübeck, Hamburg, and Bremen—the grand duchy of **Mecklenburg-Schwerin** stretches from the lower Elbe to Pomerania containing the pretty capital *Schwerin* on a lake of the same name, flanked on east and west by the two unequal divisions of the smaller grand duchy of **Mecklenburg-Strelitz.** The duchy of **Anhalt** extends in the south across the province of Saxony from the Hartz eastward, with the capital *Dessau* on the lower Mulde. In the north of the Hartz lies the main portion of the duchy of **Brunswick,** with its capital *Brunswick* (*Braunschweig*) on both sides of the little river Oker which flows from the Hartz to the Aller. Finally, the grand duchy of **Oldenburg** extends from the Jade Gulf and the lower Weser southward into the interior. Its capital, *Oldenburg*, stands on the Hunte, a left-bank tributary of the Weser; other portions of this duchy are detached from the main body. All the rest of North Germany is made up of provinces of the kingdom of **Prussia.** East Prussia extends from the Frisches to the Kurisches Haff and the Russian frontier, with *Königsberg* just above the mouth of the Pregel in the Frisches Haft. West Prussia lies on both sides of the Vistula, with *Danzig* at the mouth of that river as its chief town, and south of it comes the province of Posen with the capital *Posen* on the Warte, the chief right-bank tributary of the Oder. Silesia is the fourth Prussian province touching the Russian frontier, and has *Breslau* as its capital. Brandenburg, historically the nucleus of the kingdom of Prussia, lies between Mecklenburg and the kingdom of Saxony and between the Warte and Oder and the Elbe with its tributary the Havel. At

Spandau, the westerly fort protecting Berlin, the Havel receives its tributary the Spree. The province of Saxony lies on both sides of the Elbe, and its capital, *Magdeburg*, stands on that river. Schleswig-Holstein, in the south of Jutland, has as its capital *Schleswig*, on one of the long narrow inlets which penetrate the land from the Baltic shore. Hanover extends to the Teutoburger Wald and the frontier of the Netherlands, with its capital *Hanover* on the Leine ; and Westphalia (with *Münster* in the "bay" of the plain between the Teutoburger Wald and the Haar) and the Rhine Province on both sides of the river before it leaves Germany, complete the divisions of Prussia.

Chief Coast Towns.—The two great naval stations of Germany are *Wilhelmshaven* on Jade Bay on the North Sea, and *Kiel* on the inlet of the same name near the Baltic entrance of the Kaiser-Wilhelm Canal, which enables German war vessels to pass rapidly from one sea to the other and concentrate at any desired point on either coast. In the extreme east, *Königsberg* belongs to the group of towns that have prospered through over-sea trade, although on account of the shallowness of the Frisches Haff large vessels cannot reach the harbour, and the outport of *Pillau* on the sand-spit enclosing the lagoon has been built to carry on the trade. The navigable Pregel enables Königsberg to serve as a centre for distributing goods through the interior of East Prussia, and in winter when the Russian harbours are frozen up, there is great traffic by railway to the Baltic provinces of Russia. *Danzig* is not only the great commercial centre of West Prussia, but is important as the seaport of Russian Poland, exporting the wood and wheat brought down the Vistula. *Stettin* is similarly not only the chief seaport of Pomerania but of an extensive hinterland, even to a certain extent serving as the Baltic port of Berlin, since it is the most southerly point which sea-going vessels can reach from the Baltic, and the navigable Oder is linked by canals to all parts of northern Germany, including the Elbe system. *Lübeck*, on the Trave, which falls into the head of the Baltic bay, which reaches farthest to the south-west, has since the time of the Hanseatic League been a favourite centre for Baltic trade.

FIG. 148.—*Hamburg.*

On the North Sea coast the ports are the small *Emden* at the mouth of the Ems, and the great harbours, Bremen and Hamburg, which in happy rivalry command the whole German trade with America. *Bremen* has only recently been made accessible to the largest sea-going vessels by the deepening of the lower Weser ; but *Hamburg* receives the greater share

of the trade on account of its situation on the most south-easterly inlet of the North Sea where the Elbe allows of easy anchorage for ships of any draught, and because of the cheap water-transport by which goods can be forwarded to the interior of the country; so it has become the greatest seaport on the continent of Europe, and now realises the benefits of being no longer separated from the rest of the country by a Customs barrier. The large town *Altona*, in Schleswig-Holstein, shares the favourable situation of Hamburg, and is now united with it by continuous streets.

Inland Towns of the North German Low Plain.—Within recent years the coal-fields of the Ruhr valley have enabled many of the towns of the lower Rhine district to become great manufacturing centres. Such in particular are *Krefeld*, some distance from the left bank of the Rhine, which is now the chief silk manufacturing town in Germany, and *Düsseldorf*, the splendid river-port on the right bank of the Rhine, in close railway communication with the neighbouring Barmen and Elberfeld (see Fig. 147) and celebrated also for its Academy of Painting. In the inland trade between east and west, Cologne, Hanover, Brunswick, Magdeburg, Frankfort-on-the-Oder, and Posen have all increased in importance on account of their position at the crossing places of important rivers. *Cologne* (*Köln*), with its lordly cathedral, is naturally the most important of the series, for sea-going vessels can reach it easily from Rotterdam, thus it is a place for transhipping cargo and of immense activity on account of the great north and south river highway of the west crossing the greatest east and west railway of the north. Cologne is very strongly fortified on this account, and so are Magdeburg, the chief centre of the German beet-sugar trade, and Posen, which lies on the central line of approach from Russia towards Berlin. Breslau also, the true centre of Silesia, became important from its position at a crossing of trade routes, the roads from Bohemia through the Landeshut Pass, and from the March through Glatz, meet there and cross the Oder in the direction of Posen.

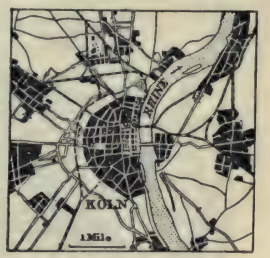

FIG. 149.—*Cologne.*

Berlin.—Berlin has grown as the seat of the Hohenzollerns in the centre of Mark Brandenburg, increasing in importance with the growing power of the Brandenburg-Prussian state. Its position on the Spree has assisted its development as a commercial town from an early period; even in the thirteenth century it shipped wheat to Hamburg, and now, by means of canals from the Spree and Havel to the Oder, goods can be carried cheaply over the whole Elbe and Oder river systems, a very important consideration for the supply of food and fuel to the city. The full advantages of situation only appeared in the nineteenth century, when the level stretches of the north-east plain, equidistant between the coast and the highlands, developed a system of direct lines of communication with Hamburg and Breslau, with

the Halle-Leipzig lowland "bay" and Stettin. Thus Berlin naturally became the greatest centre of radiating railway lines in Central Europe, in direct touch with every capital on the Continent (see Fig. 54), a huge commercial city, the head-quarters of German banking, and one of the chief industrial towns of Europe, especially for the manufacture of clothing and artistic articles, in fact, half the population live by its manufactures. Frederick the Great made Berlin a leading town in the scientific and artistic world, a position it has since maintained and improved. Including the suburbs and the inseparable town of *Charlottenburg* on the west, the total population of Berlin is at least 2,000,000, making it second in size only to Paris amongst the cities of continental Europe.

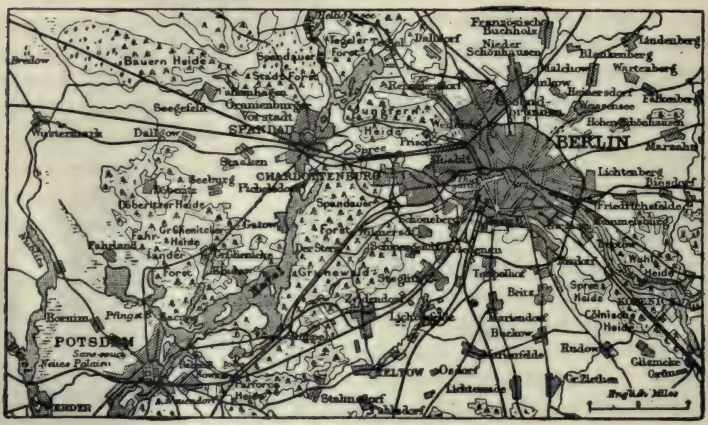

FIG. 150.—*The Surroundings of Berlin.*

STATISTICS.

AREA AND POPULATION OF THE GERMAN STATES.

State.	Style.	Area in sq. miles.	Population. In 1890. Number.	In 1890. per sq. mile.	In 1900. Number.	In 1900. per sq. mile.
Prussia (including Haffs) ..	Kingdom ..	136,116	29,957,367	223	34,472,509	253
Bavaria	„ ..	29,291	5,594,982	191	6,176,057	210
Württemburg	„ ..	7,535	2,036,522	270	2,169,480	288
Baden	Grand Duchy ..	5,822	1,657,867	285	1,867,944	320
Saxony	Kingdom ..	5,789	3,502,684	605	4,202,216	743
Alsace-Lorraine	Imperial Territory	5,500	1,603,506	286	1 719,470	306
Mecklenburg-Schwerin ..	Grand Duchy ..	5,135	578,342	113	607,770	118
Hesse	„ ..	2,966	992,883	335	1,119,893	377
Oldenburg	„ ..	2,481	354,968	143	399,180	161
Brunswick	Duchy ..	1,418	403,773	283	464,333	326
Saxe Weimar	Grand Duchy ..	1,396	326,091	235	362,873	260
Mecklenburg-Strelitz ..	„ ..	1,131	97,978	87	102,602	90
Saxe Meiningen	Duchy	953	223,832	235	250,731	263
Anhalt	„	906	271,963	300	316,085	348
Saxe Coburg-Gotha	„	756	206,513	273	229,550	304
Saxe Altenburg	„	511	170,864	332	194,914	380

AREA AND POPULATION OF THE GERMAN STATES—(*continued*).

State.	Style.	Area in sq. miles.	Population. In 1890. Number.	In 1890. per sq. mile.	In 1900. Number.	In 1900. per sq. mile.
Lippe	Principality	469	128,495	274	138,952	296
Waldeck	„	433	57,281	132	59,918	133
Schwarzburg-Rudolstadt	„	363	85,863	236	93,059	255
Schwarzburg-Sondershausen	„	333	75,510	227	80,898	242
Reuss, younger line	„	319	119,811	376	139,210	435
Hamburg	Free Town	158	622,530	3,949	768,349	4,862
Schaumburg Lippe	Principality	131	39,163	299	43,132	329
Reuss, older line	„	122	62,754	514	68,396	559
Lübeck	Free Town	115	76,485	665	96,775	841
Bremen	„	99	180,443	1,823	224,882	2,269
German Empire		210,248	49,428,470	236	56,367,178	269

POPULATION OF THE LARGEST GERMAN TOWNS.

	1890.	1900.		1890.	1900.
Berlin	1,578,794	1,888,326	Elberfeld	93,538	156,937
Hamburg	569,260	705,738	Bremen	125,684	156,718
Munich (München)	349,024	499,959	Halle	101,401	156,611
Leipzig	357,122	456,126	Strassburg	123,500	150,268
Breslau	335,186	422,738	Dortmund	89,663	142,418
Dresden	289,844	395,349	Barmen	116,228	141,947
Cologne (Köln)	281,681	372,229	Danzig	120,338	140,539
Frankfort-on-the-Main	136,819	288,489	Mannheim	79,058	140,385
Nuremberg (Nürnberg)	142,590	261,022	Aachen (Aix-la-Chapelle)	103,470	135,235
Hanover	174,455	235,666	Brunswick	101,074	128,177
Magdeburg	202,234	229,663	Kiel	69,172	121,790
Düsseldorf	144,642	213,767	Posen	69,627	117,014
Stettin	116,228	210,680	Krefeld	105,376	109,119
Chemnitz	138,954	206,584	Kassel	72,477	106,001
Charlottenburg	76,859	189,296	Carlsruhe	73,684	97,161
Königsberg	161,666	187,897	Duisburg	59,285	92,729
Essen	78,706	182,135	Augsburg	75,629	89,109
Stuttgart	139,817	176,318	Mülhausen	76,892	89,012
Altona	143,249	161,507	Wiesbaden	64,670	86,086

ANNUAL TRADE OF THE GERMAN EMRIRE (*in pounds sterling*).

	Average for 1872–75.[1]	1881–85.	1891–95.
Imports	187,041,000	157,207,000	212,960,000
Exports	124,720,000	158,039,000	172,100,000

THE GERMAN FOREIGN POSSESSIONS (*estimates*).

	Area in square miles.	Population.
German East Africa	384,180	8,000,000
Kamerun	191,130	3,500,000
Togoland	33,700	2,500,000
German South-West Africa	322,450	200,000
German New Guinea	70,000	110,000
Marshall Islands	150	13,000
Caroline and Marianne Islands	610	40,000
Total	1,002,220	14,363,000

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[1] The earlier statistics are less satisfactory than the later.

CHAPTER XVIII.—THE AUSTRO-HUNGARIAN MONARCHY

I.—AUSTRIA-HUNGARY

By Dr. Albrecht Penck,
Formerly Professor of Geography in the University of Vienna.

Position and General Character.—The Austro-Hungarian Monarchy lies in the latitude of France, between 42° and 51° N., but farther east, in the interior of the continent, between 10° and 26° E. long. Whilst France has the sea on three sides and has longer coast-lines than land frontiers, Austria-Hungary is only touched by an arm of the Mediterranean, and its land frontiers, towards the German Empire, Russia, Rumania, Servia, Turkey, Montenegro, Italy and Switzerland, are five times longer than its coast-line. No other part of Europe has so great a variety of geographical features, climates and nations. It embraces the greater part of the Eastern Alps, with their high, snow-clad summits, the greater part of the Boian or Bohemian plateau, nearly the whole chain of the Carpathians, with a large part of their northern forelands, the nearly level plains of Hungary, and a part of the Dinaric Mountains of the Balkan peninsula. Its western parts are under the climatic influence of the Atlantic Ocean; in the east a continental climate prevails, with hot summers and cold winters; the south has the mild winters and dry summers of the Mediterranean, whilst the highest summits in the Alps and Carpathians have the mean annual temperature of the Arctic regions. Extensive forests are found, especially in the mountain districts. The eastern plains in the interior of Hungary, and on the northern slope of the Carpathians, are natural meadows, belonging to the steppes of south-eastern Europe. Considerable areas in the south show bare rock with only traces of vegetation. All the races of Europe are represented in the Monarchy. The north-west belongs to the *Teutonic* race—it is German. The east is occupied by different *Slavonic* peoples, separated into a northern group of three, the

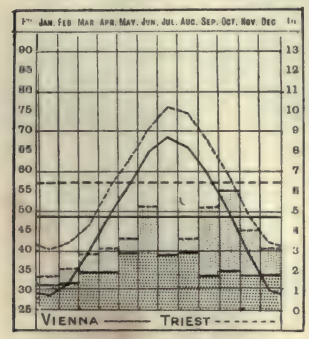

FIG. 151.—*Mean Monthly Rainfall and Temperature Curves of Vienna and Trieste.*

Chechs, Poles and Ruthenians; and a southern group of two, the Croats and Slovenians; and by the *Hungarians*, whose language is not allied to that of the other European races, but points to an affinity with the Uralian peoples. The Mediterranean coasts and the south-east corner belong to the *Latin* race; Italians in the west and Rumanians in the east. There are only three provinces of Austria in which one language (German) is generally spoken. In Hungary there are numerous villages and even towns where three distinct languages are in common use. As to religion, only the western parts of Austria are uniform; they belong to the Roman Catholic Church. In the east Greek Catholics, adherents of the Eastern Church, and Protestants of different denominations are met with, and in several towns the Jewish population is in the majority. On the Mediterranean coasts the civilisation is directly derived from the Romans; the Alpine and Boian countries have shared in the evolution of German life since the Middle Ages. The Carpathian lands and Hungary possess a newer civilisation, the Turks having been driven out from several parts only two hundred years ago. The Dinaric lands are only now entering into the life of civilised Europe. The north-west of the Monarchy belongs to the great manufacturing belt of Central Europe; the east, however, to the agricultural lands of Eastern Europe.

Boundaries.—All these differences are found in a group of countries which are united by their natural frontiers. The northern boundary is determined by a nearly continuous succession of different mountains. There are the mountainous rims of the Boian lands, which surround the upper Elbe basin, and the long arc of the Carpathians around the basin of the middle Danube; thus Bohemia and Hungary are circumscribed, and both countries are connected by frequent passes. South of Bohemia the Eastern Alps form a mountainous country, which, drained mainly by the Danube, is connected by that river with the Hungarian basin. The same holds good of the Dinaric Mountains. Austria-Hungary is in fact the basin of the middle Danube, with its mountainous surroundings, to which is added the neighbouring upper Elbe basin. Only that part of the Danubian slope of the Dinaric Mountains, which forms the kingdom of Servia, does not belong to the Monarchy, and there the frontiers are determined by the great river Save On the other hand, the Monarchy reaches the Adriatic Sea and stretches in the Alps into the basin of the Adige, and even of the Rhine. In the north-east Austria extends over the water-parting of the Carpathians and embraces the lowlands beyond. Towards the north a natural limit is drawn by the infertile land along the Vistula, the river itself forming the boundary for a considerable distance, but towards the east the frontier is arbitrary. There are four considerable openings in the mountain border, one by which the Danube enters Austria as a navigable river; the second by which it leaves Hungary; the third is a breach between the Sudetes and the Carpathians; and the fourth is the saddle-like gap between the Alps and the Dinaric Mountains, which opens the way to the Adriatic Sea. Two highways of

European commerce are determined by these openings ; one follows the Danube to the south-east, to Asia Minor, the other connects the Mediterranean with the great plains of northern Europe. The crossing of both ways is the site of Vienna, the capital of the Monarchy, and a great centre of European activity.

People and History.—The large Austro-Hungarian basin has always been an attraction for the neighbouring peoples, but it has rarely been in the possession of one nation. The Romans extended their Empire over the south-western half, in general not farther than to the Danube. They were thrown backward to the Mediterranean coast by Teutonic peoples who did not occupy the conquered country, but left it to the Slavonic tribes which wandered, in the sixth century, over nearly the whole ground with the exception only of the western Alpine provinces. Then came a new German immigration. The Bavarians followed the course of the Danube on its right bank, and settled between the Slavonic clans as far as the mouth of the river Drave. Charles the Great (Charlemagne) extended the frontiers of his mighty empire as far east as this, forming its eastern marches (Ostmark) there ; and he also conquered Bohemia. In this way the western half of the Monarchy became connected with the old German Empire. The east, however, was conquered at the end of the tenth century by the Hungarians, who formed a national kingdom ; another arose in Poland, a third in Bohemia, which however never ceased to be a German fief. Some of the rulers of these kingdoms favoured German immigration, and North Germans cleared the forests of the Boian mountains and of the Carpathians as far as Transylvania, and founded numerous towns on the left bank of the Danube, those on the right being mostly of Roman origin. In 1276 the remnants of the old eastern marches, then called *Oesterreich* (Eastern realm), came into the possession of the Habsburg family, who gained the neighbouring countries by treaties of inheritance. At first they obtained the Alpine provinces, and later succeeded to Bohemia and Hungary. This happened at a moment when the Turks had invaded Hungary, and it needed two hundred years of continual fighting to conquer that kingdom, and after its conquest Germans were settled on the devastated lands. When, at the end of the eighteenth century, the kingdom of Poland was divided, Austria gained Galicia, and soon afterwards received Bukovina from the Turks. When the old German Empire ceased to exist the Habsburg countries were declared an Austrian Empire, and this was enlarged after the Napoleonic wars by some provinces in Italy, which have since been lost, with the exception of the Venetian colonies on the east shore of the Adriatic Sea, in Dalmatia and Istria. Finally, in 1878, the adjoining parts of Turkey (Bosnia and Hercegovina) were occupied, though nominally they still belong to the Sultan.

Organisation.—The gradual growth of the Monarchy can be compared with a crystallisation of lands around their natural centre, that is, Vienna. This happened in a peaceful way ; the different countries pre-

served their own organisations, and their inhabitants retained their own languages; but by the fact that German colonists were and are active nearly everywhere the whole came into the sphere of German culture, and though the Germans form only 27 per cent. of the population, German is the language of intercourse of the whole Monarchy, and is spoken by every educated man. Several attempts to amalgamate the different countries of the Monarchy into one uniform State have been made and failed. In 1867 complete home rule was established for Hungary, and the title of the Austrian Empire was replaced by that of the Austro-Hungarian Monarchy. This name recalls that of the United Kingdom of Great Britain and Ireland. Indeed, the relations between Austria and Hungary may be compared to those between Great Britain and Ireland as they were before the final union. The Emperor of Austria is always King of Hungary, and in Hungary uses only that title. The foreign relations, the army and navy, as well as the customs-tariffs and currency, are common affairs to the whole Monarchy. In their internal administration both moieties of the Monarchy have complete independence, with their own parliaments and governments. Delegates elected by both parliaments arrange a new mutual treaty (*Ausgleich*) every ten years, and control the common affairs, which are administered by common Ministries for Foreign affairs, War, and Finance; the last named also administers Bosnia and Hercegovina. The official title of Austria is, "The Kingdoms and Countries represented in the Reichsrat" (Austrian parliament); Hungary is called "The Lands of the Hungarian Crown." Thus, independent in their own administration, both moieties are mutually dependent on one another in all foreign matters; and both together form one of the six Great Powers of Europe with a common flag.

FIG. 152.—*Austria-Hungary, showing countries and provinces. Austria white, Hungary stippled.*

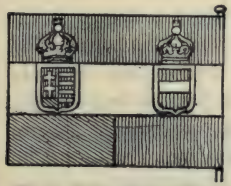

FIG. 153.—*Austro-Hungarian Merchant Flag.*

II.—AUSTRIA

By Dr. Albrecht Penck,

Formerly Professor of Geography in the University of Vienna.

The Empire of Austria.—Austria embraces the old Habsburg possessions of the Alps (Lower and Upper Austria, Salzburg, Styria, Carinthia, Carniola, Tirol, Görz, Triest), most of the lands of the old kingdom of Bohemia (Bohemia, Moravia, Silesia), parts of the former kingdom of Poland (Galicia and Bukovina), and the Venetian colonies on the east side of the Adriatic (Istria and Dalmatia). These four historical groups correspond in general to the natural groups of the Alpine, Boian, Carpathian, and Dinaric lands. Each of these groups consist of provinces or Crown lands (Fig. 152), which still bear their old titles such as kingdom or duchy, &c. Each has its governor, called *Statthalter*, and its own provincial diet or parliament. They are all represented together in the *Reichsrat*, or Austrian parliament, partly by popular election, partly by the election of privileged classes.

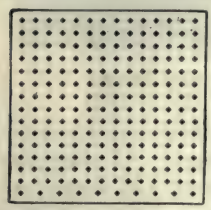

Fig. 154.—*Average population of a square mile of Austria.*

Alpine Provinces.—The Alpine lands of Austria cover the larger part of the Eastern Alps and of the northern and eastern Alpine forelands. The characteristic features of the Austrian Alps are two long rows of longitudinal valleys, with a mean elevation of 2,000 to 2,500 feet running, like the mountains, from west to east. They separate a central zone from two lateral mountainous belts. The Central Zone consists of ancient rocks, gneiss, mica-schist and granite. In the west it is cut into separate groups of mountains, which reach heights of from 12,000 to 13,000 feet, and are divided by passes of moderate elevation; the Ortler (12,800 feet) is the culminating point; the Brenner (4,400 feet) is the lowest and most important pass (Fig. 51). East of the Brenner the Central Zone forms a long wall with summits of 12,460 feet (Gross Glockner), which is not interrupted by any pass lower than 7,500 feet for a distance of 100 miles. Farther east their height diminishes to 6,000 feet, and glaciers cease; the mountains lose their rugged form and become rounded, the valleys widen at several places, especially in Carinthia, into basins, and some passes are below 3,000 feet. The lateral zones of the Eastern Alps consist of limestone, and are therefore called the Northern and Southern Limestone Alps. In the west they are lower than the Central Zone; the Northern range does not reach more than 10,000 feet, the Southern not more than 11,500 feet. In the east, however, they surpass the Central Zone, and even at their ends have heights of 6,600 feet on the north, and 8,200 feet on the south.

In general, they rise as steep masses of naked rock, separated by deep valleys and low passes. In some parts there are beautiful lakes in these hollows, *e.g.*, the Garda-lake, Achen-lake in Tirol ; and the lakes of the Salzkammergut. The Northern Belt is cut through by three important rivers, which leave the northern row of longitudinal valleys ; the Inn, the Salzach and the Enns are direct affluents of the Upper Danube. Only one river of this line, the Mur, turns to the south-east and reaches the eastern forelands. In the southern row of valleys, however, the main river, the Drave, flows eastward, and parallel to it farther south is another Alpine affluent of the middle Danube, the Save. Only one river of the southern line, the Adige, or Etsch, turns in a deep valley to the Plain of Lombardy on the south. There are numerous other passages between the steep mountains, especially in the east, where the valleys of the Drave, the Save and the Tagliamento are connected by a set of passes lower than 2,700 feet.

North of the Alps there is a narrow strip of flat, undulating land, which sinks eastward from 1,500 to 600 feet in elevation. It is narrowed in the middle by the projecting southern corner of the Boian plateau to a width of only six miles, forming the important *Austrian Gap*. To the west and east this foreland widens out between its mountainous walls. Its general trend is followed by the Danube ; but this mighty river prefers the course in a gorge-like valley through the border of the Bohemian plateau to that in the lowlands. At Krems it leaves the plateau and runs to the north-eastern extremity of the Alps at Vienna. In the east several chains of the Alps branch off into the Hungarian plain, a corner of which penetrates basin-like between them westward. The frontier between the two countries cuts off the branches and leaves the Styrian basin with Austria. It is a hilly country, which rises gradually from 600 to 1,500 feet. In the south-east the Southern Limestone Alps are connected with the Dinaric Mountains by the saddle-like Karst plateau, whose lowest point is a little below 1,900 feet. It consists principally of limestone and exhibits the typical development of all those features which are called Karst phenomena. A distinct valley-system is wanting ; the rivers run over flat basins, descend into caves, and reappear as great springs in other basins. The surroundings of Adelsberg are famous for the cave where the river Poik disappears. In the same neighbourhood the lake of Zirknitz is formed now and then by the inundation of the low grounds from springs. The grandest scenery is found along the subterranean course of the Reka in the Caves of St. Canzian (Fig. 158).

Climate and Agriculture of the Alpine Provinces.—The climate of the Alpine lands shows great variety. The highest meteorological station on the Sonnblick (*i.e.*, Sun-glimpse, 11,190 feet) has the winter of north-east Russia and the summer of Franz Josef Land. In the principal valleys the climate of the Alpine forelands reigns in a somewhat intensified form. Thus the eastern valleys have a strongly continental

climate with cold winters; in the valley of the Adige, however, the Mediterranean climate with warm winters extends nearly to the centre of the mountains, where Bozen and Meran lie in a climatic oasis. The northern valleys, like the northern Alpine forelands, have the relatively mild winters of western Central Europe, and the temperature is often raised by a warm south wind, called *föhn*. The range of temperature, however, is determined also by the elevation, and is less in the interior than in the border regions, especially on the forelands; on the Karst plateau, however, it is raw and severe. The rainfall is highest on the northern and southern rim of the mountains, where it rises in several places to 80 inches per annum; the valleys are dryer than the forelands. The snowfall increases with the elevation, and from 8,500 feet in the border region, from 10,000 feet in the inner parts, the Eastern Alps are covered to the extent of 600 square miles with perpetual snow. The Austrian Alps produce 1,000 glaciers; the largest and finest is the Pasterze, near the Gross Glockner, 12 square miles in area.

Below the snow-line there is a zone of natural pastures, called the Alpine region. The last trees mount up to 6,000 feet, and in the interior at several places to 7,000 feet. The high ground is used during the summer as pasture; the lower slopes are woodland. Cultivated fields are rarely found above 4,000 feet. Agriculture is therefore concentrated in the valleys, and no large village lies higher than 4,000 feet, only some hamlets are met with in the western Central Zone as high as 6,000 feet. In the northern and eastern valleys grain is grown; in the valley of the Adige vine-growing prevails, and the mulberry-tree is cultivated for silkworms. In the three Alpine provinces which are confined to the mountains (the County of *Tirol* with *Vorarlberg*, and the Duchies of *Salzburg* and *Carinthia* or *Kärnten*) nearly one-half of the ground is uninhabited; only one-seventh of the area consists of arable land, while three-fifths are woodland and one-fourth pasture lands. The density of population averages 85 per square mile. The Alpine forelands, however, are excellent agricultural lands. In the eastern parts of the northern and in the Styrian basin there is extensive vine-culture; the Karst plateau bears still in most parts its extensive original forests. The four Alpine Crown-lands, therefore, which lie partly on the forelands, are far better populated than the three of the interior. The arable lands amount to 30 per cent., and the pastures to less than 10 per cent. The Archduchies of *Lower* and *Upper Austria* (*Unter-* and *Ober-Oesterreich*), which extend from the Alps over their northern forelands and the opposite slope of the Boian plateau, have (without Vienna) 184 inhabitants per square mile, while the Duchies of *Styria* (*Steiermark*) and *Carniola* (*Krain*), which extend over the eastern parts of the Alps, the Styrian basin and the Karst, have 149.

The principality of **Liechtenstein** is a very small independent State on the western frontier of Vorarlberg, united with Austria-Hungary merely by a Customs treaty.

Minerals and Manufactures of the Alpine Provinces.—The gold mines of the Central Zone being now exhausted, there are only five important mineral products in these mountains : salt in several parts of the Northern Limestone Alps ; iron in Styria and Carinthia, especially at Eisenerz, where a whole mountain consists of the purest iron-ore (whence the name) ; lignite in some parts of Upper Austria, in the valleys of Styria and the Styrian basin ; lead in Carinthia (at Bleiberg) and Carniola ; and mercury at Idria in Carniola. The Styrian iron, worked only with charcoal, already known to the Romans as Norian, has caused an extensive iron-manufacture in the valleys of Upper Styria and the neighbouring parts of Lower and Upper Austria. But since the new processes of refining enable good iron to be made from poor ores, the Boian lands with their coal have become the chief centre of iron manufacturing in Austria. Another industrial region of the Alpine lands is close to the Swiss frontier in Vorarlberg, where there are numerous spinning factories, and where embroidery is a branch of domestic industry. A third is in the south of Tirol, where silk is produced and manufactured.

Communications and Towns of the Alpine Provinces.—The great lines of communication avoid the Alps as far as possible and follow the Alpine forelands. There are two important routes in the northern and eastern foreland, both converging on Vienna. (1) That of the northern foreland has the natural waterway of the Danube, and is followed by the Western Railway of Austria, which prefers, however, the low country between the Alps and the Boian plateau to the narrow valley of the great river. Where the river leaves its gorge for the first time and runs for some miles along the Alpine foreland, *Linz*, the capital of Upper Austria, is situated ; and where the land route passes into Bavaria at the entrance of the Valley of the Salzach, lies *Salzburg*, the beautifully situated capital of the duchy. (2) The eastern foreland route, which goes to the sea, has no waterway, although an artificial one was commenced but not finished ; it is followed by the Southern Railway which has rather heavy gradients, for it cuts off the north-eastern branch of the Alps, ascending by a wonderful piece of engineering to the Semmering Pass (3,000 feet) and crossing the Karst. *Graz*, the capital of Styria, stands on the Mur, where the railway enters the Styrian basin. The quarters on the left bank of the Mur are the site of the Government offices, of a university and a technical school. On account of their garden-like surroundings they are much favoured by Austrian pensioners. On the right side of the river there are large industrial establishments. The ascent of the Karst begins at *Laibach* (*Lubiana*), the capital of Carniola, in a wide and partly fertile basin. The Southern Railway connects with a line going over the low passes of the Central Zone and between the Drave and Tagliamento directly to Italy. It passes near *Klagenfurt*, the capital of Carinthia. One other great railway crosses the western part of the Central Alps by the Brenner ; it connects Germany with Italy and is therefore of international importance. It leaves the Inn Valley at *Inns-*

bruck, the capital and university-city of Tirol, and reaches the valley of the Adige at *Bozen*, a place well known for the grandeur of its surroundings. Farther down the line *Trient* (*Trento*) is the capital of the industrial part of Tirol with Italian population. A third railway across the Eastern Alps is in course of construction between Salzburg and Sorizia. The long northern row of longitudinal valleys has special importance for Austria, as they establish a direct connection with Switzerland, which is made practicable by a tunnel almost 6½ miles long through the Arlberg.

Taken as a whole, the Alpine provinces of Austria are a poor country, though there are some very rich parts in the valley of the Adige and on the Alpine forelands. One-tenth of their area is uncultivated, nearly one-fourth is poor pasture land, only one-fifth is arable. The population, without Vienna, is less dense than anywhere else in Austria, there being only 140 per square mile. It is for the greater part German (72 per cent.); Italian, however, in the south of Tirol (8 per cent.), and the Slovenian language is spoken in parts of Styria and Carinthia, and nearly the whole of Carniola. Cattle, cheese, wine, wood, iron, lead, and mercury form the chief exports; grain must be imported. In recent years the higher parts especially of Tirol, with their magnificent glaciers of the Oetzthal, Zillerthal, and Sulden, and the grand rocky scenery of the Dolomites, have become favourite summer resorts. Visitors also flock to the valleys of Salzburg, Upper Austria (the Salzkammergut), and Carinthia with their charming lakes. The south of Tirol is important as a winter resort, especially *Meran*, *Arco* and *Riva* on the Garda lake. The hot springs of *Gastein* in the Central Alps and those at several places along the eastern rim of the Alps, *e.g.*, *Baden* near Vienna, *Gleichenberg* and *Römerbad* in Styria, are much frequented.

Bohemia.—The Boian lands of Central Europe form a plateau of primitive and Palæozoic rocks, which are covered only in the north by Cretaceous sandstones and marls. The centre is a basin-like depression forming Bohemia; the peripheral parts belong in the north and west to the German Empire, in the south to Upper and Lower Austria, and in the east to Moravia and Silesia. *Bohemia* (German *Böhmen*) is nearly conterminous with the upper Elbe basin. Its south-west side is formed by the parallel ridges of the Bohemian forest, which reach nearly 5,000 feet in the south, whilst they are in general lower than 3,000 feet in the north. On the north-west side the Erzgebirge (Ore Mountains) rise abruptly to heights of over 4,000 feet, which slope gently down to Saxony. The Sudetes chain stretches in the north-east, the highest part, known as Riesengebirge (Giant's Mountains) reaches in the Schneekoppe (snow-dome) an elevation of 5,300 feet, which is the highest point of West-Central Europe north of the Alps. Only the south-east side of Bohemia is without a distinct chain of mountains; but instead there is a highland region averaging 2,000 feet in elevation and in two groups of mountains approaching 3,000 feet. The interior of Bohemia is hilly in the southern

half, and has a mean elevation of 1,500 feet; some chains, such as the Brda (mountains) exceed 2,500 feet. The north is in general a level lowland, from 600 to 900 feet in elevation; near the Erzgebirge there is a group of isolated conical mountains of volcanic origin, called the Mittelgebirge, 2,800 feet in height, and in the northern corner a plateau of sandstone extends, which is dissected by numerous valleys and gullies, forming the wonderful scenery which is generally known under the name of Saxon Switzerland, but which, for the greater part, belongs to Austria.

The drainage of Bohemia is very regular. The Moldau, running from south to north, forms a median axis to which rivers approach from both sides. Among them is the Elbe, which comes from the Riesengebirge and continues the course of the Moldau northward. It breaks through the Mittelgebirge in a charming valley, and leaves Bohemia in a winding gap of the sandstone mountains walled by heights of 400 feet. This is the only point at which Bohemia can be left at a level below 1,500 feet.

Climate and Vegetation of Bohemia.—The climate of the interior lowland is very agreeable, the summer is warm, the winter not too cold. The rainfall is moderate; some parts, especially at the foot of the Erzgebirge, are dry, the annual precipitation being only 16 inches. In the south the climate is more severe, and it is raw on the surrounding mountains. The winter is rich in snow, but the elevation is nowhere so high as to bring Bohemia beyond the limits of forest growth, and its whole surface is productive. The excellent soil of the interior lowland favours extensive agriculture; wheat and beetroots are grown on the southern slopes of the Mittelgebirge, the vine is productive as far north as in the Rhine valley, and hops are cultivated at the foot of the Erzgebirge. Orchards surround all the villages. The hilly south is a rye, oat, and potato country; while extensive forests cover the mountains of the interior and of the border region. More than one half of Bohemia is cultivated as arable land, and two-fifths are well-administered forests.

Bohemian Minerals, Manufactures and Towns.—The wealth in precious metals once attracted many settlers, especially to the Erzgebirge; now most of the mines are exhausted; only at *Mies* in the west and at *Przibram* in the centre there are still silver mines, the latter being the deepest on the continent (3,691 feet). The actual mineral wealth of Bohemia consists in its coal. Coal Measures occur in the centre near Prague and Pilsen; lignite is found in enormous quantities, sometimes in layers nearly 100 feet thick, at the foot of the Erzgebirge near *Teplitz*, *Dux* and *Brüx*, and near *Eger*. The centre has iron mines, and all the conditions for extensive iron working exist. The quartz of the sandstone mountains in the north has given rise to glass manufactures of all kinds, especially of the well-known Bohemian cut glass. The kaolin deposits connected with the granite of Karlsbad favour the making of porcelain.

The rapid rivers of the Sudetes supply power for many spinning factories; cotton manufactures are spread over the whole of the mountains, and *Reichenberg* is a centre of woollen manufacture. Many paper mills work up the wood of the forest districts. A flourishing sugar manufacture is based on the extensive cultivation of the beet; beer of superior quality is brewed, especially at *Pilsen*. Numerous thermal springs are connected with the former volcanic activity on the foot of the Erzgebirge. *Teplitz*, *Karlsbad*, *Franzensbad* and *Marienbad* are bathing-places of European celebrity. The picturesque scenery of the sandstone mountains near the Elbe Gap is also well known as a tourist resort.

The kingdom of Bohemia belongs to the densely populated countries of Central Europe. Its population has an average density of 315 per square mile; but in the industrial parts of the north it rises to 1,000 and 1,200. Of the people 37 per cent. are German, occupying the border region, especially the industrial district of the north, and 63 per cent. Chechs, who occupy the centre, and reach the frontiers only at three places.

The peripheral arrangement of the mountains and the convergent course of the rivers of Bohemia favour the development of a natural centre, which is the main crossing-point of all radial lines of communication. This is *Prague* (*Prag*, *Praha*). It lies in the midst of the country on both sides of the Moldau in a rather narrow valley, but the suburbs extend over the neighbouring heights. Seen from the Hradschin, the castle of the old Bohemian kings on the left bank of the Moldau, the city is highly picturesque, with its numerous towers and monumental buildings on prominent points. But the interior is narrow and unhealthy; an aqueduct is wanting, and the population increases slowly. Prague is the capital of Bohemia, with the Government offices, two universities and two technical schools—one for the Germans, one for the Chechs. The suburbs, which raise the number of the mainly Chech population to over 470,000, are the industrial quarters. The manufacture of engines and railway cars is considerable. The other towns of Bohemia are of less importance. They lie on the numerous radial railway lines near the frontiers, *Budweis* on the southern, *Pilsen* on the south-western, and *Reichenberg* on the northern line. The Elbe is the chief traffic route from Bohemia to the sea; on it, the frontier is passed annually by 20,000 vessels, and there are railways on both sides of the river. *Aussig* and *Bodenbach-Tetschen* are considerable river-ports.

Moravia and Silesia.—Moravia and Silesia (in German *Mähren* and *Schlesien*) occupy the south-east side of the Boian plateau and stretch over the lowlands, bordering the western chains of the Carpathians, which form their eastern frontier. The south is drained by the March to the Danube, the north by the Oder to the Baltic Sea. The water-parting between the two rivers is low in the Carpathian forelands, and forms the deep Moravian Gap between the Boian plateau and the Carpathians. It allows of the construction of a canal connecting the Baltic and Black Seas, the summit level on which is less than 1,000 feet.

In the north of both countries, at the sources of the Oder and the March, the eastern extremity of the Sudetes forms a plateau 2,000 feet high, and rising in the Altvater to nearly 5,000 feet. In spite of the rough climate there is a crowded German population, carrying on the Austrian linen manufacture. In the south the low ground penetrates basinlike between the Boian plateau and the Carpathians; the climate of these parts is mild, and agriculture flourishes; barley and beetroot are extensively grown; even the vine is found. The Carpathians at the eastern frontier are extensively wooded. The Silesian coal basin of Prussia extends over the Austrian frontiers; *Witkowitz* and *Mährisch Ostrau* are the chief places for coal-mining in Austria, and since the neighbouring Carpathians supply iron, there is also a centre of iron manufacture. The plateaux at the sources of the Oder contain beds of roofing slates, which are much worked. The south has scarcely any mineral wealth. The Margravate of Moravia and the Duchy of Silesia have an average density of population of 295 per square mile; the industrial north having a denser population than the agricultural south—in some parts of Silesia there are 1,000 inhabitants to the square mile. Of the people, 33 per cent. are Germans, 60 per cent. are Chechs, and 7 per cent., in the eastern parts of Silesia, are Poles.

Towns of Moravia and Silesia.—The lowland between the Carpathians and the Boian plateau is the principal way of communication of the Monarchy. Its rivers are not navigable, but it is followed by the most frequented Austrian railway, the Northern. It points to Vienna, which therefore absorbs the Moravian trade, and hinders the development of any considerable centre in that country. The capital of the margravate is *Brünn* (*Brno*), on the edge of the Boian plateau, where the main route from Bohemia enters the lowlands. It is the chief centre of Austria for woollen manufactures, and has two technical schools. One-half of its inhabitants are German. Another woollen manufacturing place is *Iglau*, a German-speaking town on the heights adjoining Bohemia. The former capital of Moravia, *Olmütz*, is situated in a fertile basin of the Upper March, and has, though it is the ecclesiastical centre of the country, only local importance. The capital of Silesia, *Troppau*, is an active place with a German population close to the Prussian frontier.

Vienna.—The two main routes in the eastern and northern Alpine forelands and the Moravian route along the south-east side of the Boian plateau meet at Vienna. In the east there is a whole series of gaps between the Alps and the Carpathians, termed together the Hungarian gate, where the Danube enters the great Hungarian plains. Vienna, therefore, has a commanding position between the Boian and Alpine lands on one side, and Hungary on the other. The routes through the Austrian Gap to South Germany, and through the Moravian Gap to the plains of northern Europe, unite here with the Semmering route to Italy, and the ways through Hungary to the south-east of Europe. Over the low

south-eastern edge of the Boian plateau the Elbe Gap of Bohemia can also be easily reached, and by means of the longitudinal valleys of the Alps the Rhine basin is accessible. Vienna lies at the crossing of great routes from London, Berlin and Paris to Constantinople, and from St. Petersburg to Rome (Fig. 54). Its general situation has thus no equal in Europe, and the more immediate surroundings of its site are also very distinguished.

The north-eastern branch of the Alps, called the Kahlengebirge, terminates with a height of nearly 1,800 feet over the low plain of the Vienna basin with an elevation of 600 feet, and both are cut off by the magnificent river. The mountains bear a beautiful forest, the Wiener Wald; their

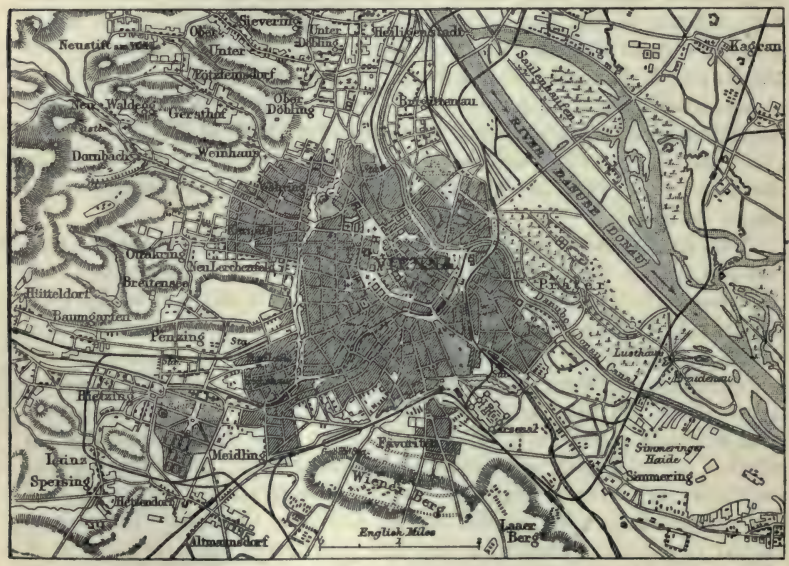

FIG. 155.—*The Site of Vienna.*

base is covered with vineyards, and the plain is richly cultivated. The site of the city is the corner between mountains, plain and river. Only one industrial suburb (*Floridsdorf*) lies on the left bank of the Danube, and only the smaller part of the city is on the river plain; the principal quarters extend on the hills to the right of the river and stretch even into the valleys of the Kahlengebirge, along the base of which there is a continuous belt of small towns from *Klosterneuburg* in the north to *Mödling* in the south, a distance of 20 miles. Vienna is the intellectual and material capital of Austria-Hungary. It is the seat of the Imperial Court, of the Common Ministries and of the Austrian Government. There is an old, much-frequented university, and there are also a polytechnic school,

an academy of agriculture, and rich museums of fine art and natural history. Commerce has at its disposal in the Danube the longest waterway of Europe outside Russia, and eight important railways radiate in all directions. The city and its neighbourhood form the chief industrial district of the monarchy. There are extensive iron and engine works, the manufacture of all kinds of metal goods, especially of bronze and instruments, is important; Viennese furniture, clothes, leather and fancy wares are objects of large export. In the Vienna basin there are numerous spinning factories and paper mills.

Vienna (German *Wien*) derives its name from the Roman camp of Vindobona, but it does not retain many signs of high antiquity. The sieges of the Turks destroyed the ancient suburbs totally, and large parts of the city; the magnificent St. Stephen's Cathedral is the only relic of ancient times. The older houses date principally from the eighteenth century, but the greater part are modern; the Ringstrasse is one of the most magnificent modern boulevards in the world. The quickly increasing population is almost exclusively German.

The Carpathian Lands.—The long arc of the Carpathians is occupied by Austria only on its western and north-eastern slopes. The former stretches through Moravia and Silesia, the latter through Galicia and Bukovina. These two Crown-lands extend from the mountains over the Carpathian foreland; and Galicia even reaches the Podolian plateau, which forms the water-parting between the Dniester and the Dnieper. The Austrian Carpathians form a chain of sandstone ridges which continue the Kahlengebirge, at first in a north-easterly and then in a south-easterly direction. In the west they gradually rise to 4,000 feet in Silesia and 5,000 feet in western Galicia; at the point where the direction of the chains turns at a right angle there are numerous passes of from 1,150 to 2,000 feet in height, called the Eastern Beskids, which afford short passages from Galicia to the plains of lower Hungary; the Western Beskids are the passes between Silesia and upper Hungary. The eastern chains rise in the Czornahora (Black Mountain, over 6,750 feet). In the south of these sandstone mountains the Upper Hungarian plateau extends. It consists of old rocks, which now and then rise to sharp ridges. The highest is the High Tatra, which culminates with 8,740 feet. From this highest part of the whole Carpathians two rivers break through the sandstone chains; along one of them the frontier of Galicia sweeps up to the High Tatra. The sandstone ridges of the Carpathians are thickly covered with forests; the whole chain, therefore, is often called the Forest Carpathians. Only the highest chains of the east arise above the tree-line; they are covered with grassy flats called polonines, which correspond to the Alpine region. The Tatra, however, is a rocky ridge with some deep corries, the tarns of which are called "eyes of the sea."

Galicia and Bukovina.—The Carpathian foreland is a low, undulating country with a mean height of from 600 to 900 feet. As there is

only a low watershed in the west between the March and the Oder, there are also in the east, in Galicia, low water-partings between the Vistula, Dniester and Pruth. These rivers are navigable for flat-bottomed boats. The soil is fertile, with the exception of the angle between the Vistula and the San, where it is too sandy. The Podolian plateau swells gently north of the Dniester, and forms an escarpment of 600 feet against the flat moorlands, which are drained to the Vistula and to the Dnieper. The water-parting between the Baltic and Black Seas is here flat and indistinct. Numerous parallel rivers run from the plateau southward to the Dniester; they have, like the latter, a meandering course, and flow in deep valleys. The heights of the plateau are part of the steppes of south-eastern Europe; the woods are restricted to the steep sides of the valleys.

The climate of Galicia and Bukovina is continental; the summers are hot, the winters cold; the country is open to the snowstorms of Russia. The rainfall is not great, but occurs throughout the whole year. In the mountains it is sufficient, but the temperature is low. By their elevation the Carpathian lands are divided into agricultural lowlands and wooded highlands. Nearly one-half of the land is arable; wheat and maize in the east, rye and potatoes in the higher regions, are the chief crops. The forests cover two-sevenths of the surface; they consist in the lower mountains of beech (the name of Bukovina is derived from the beech forests), and in the higher regions pine woods prevail. The sandstone of the Carpathians contains natural oil at numerous places, which is bored for, especially at Drohobycz, in the same way as in Pennsylvania. Natural wax is also dug. The Carpathian foreland is rich in salt, which has been mined as rock-salt at Wieliczka, near Cracow, for centuries; at Stanislau and other places it is obtained in the form of brine. In the west a small part of the Silesian coal-field extends into Galicia.

The population of the Carpathian lands is large, and its density is nearly the same as the average for Austria. The lowlands continue the thickly populated zone of the German central mountains eastward to the Podolian plateau, and there 300 per square mile are found. The Carpathians are, however, poor in men. There are still hundreds of square miles in eastern Galicia and Bukovina covered with virgin forests, without a single village. The two Slavonic nationalities in Galicia are nearly equal in number; the west belongs to the Poles (55 per cent.), who are dominant, the east to the Ruthenians (42 per cent.). In Bukovina the latter meet with the Rumanians, and there are 22 per cent. of Germans. The general condition of the population is unsatisfactory. There are rich landowners and poor peasants, whose wages are below the minimum which can be held sufficient, and who are, for the greater part, illiterate. The trade is in the hands of the Jews, who form one-eighth of the inhabitants; manufactures are undeveloped, with the exception of distilling brandy, which, together with potatoes, forms the usual diet of the people. Everything else must be imported; the exports

consist of grain, cattle, wood and horses, which are bred in the east, especially in Bukovina.

Towns of the Carpathian Lands.—The Carpathian foreland in Galicia is followed by one European main route. In the south the mountains, in the north the swamps of the Pripet, hinder free communication. The ways from western Austria and Germany to the south-east converge to one point of the western Carpathian foreland, run together on the east, and diverge on the Podolian plateau to Russia and Rumania. Thus there are two centres in Galicia. *Cracow* (German, *Krakau*, Polish, *Kraków*) commands the entrance from the west, and the substantial appearance of the city bears witness to its importance from olden times, when it was one of the outposts of the Germans in the east. Later, Cracow was the capital of Poland ; the Polish kings are buried there, and it is still a centre of Polish life. It has an old Polish university and a modern Polish Academy of Science. The commerce is still considerable. The commanding position of the city is expressed by its selection as one of the strongest Austrian fortresses for the defence of the upper valley of the Vistula. The inhabitants are mostly Poles. *Lemberg* (Polish, *Lwow*) is the radiating point of the east. Here the main railway line, which follows the Carpathian foreland, and is the continuation of the Austrian Northern Railway, sends off two branches to Russia, to Kiyev and to Odessa, and is connected by a transverse line with Budapest. Lemberg was, since its foundation, the capital of the Ruthenian provinces of Poland, and the neighbourhood has a Ruthenian population, but its inhabitants are for the greater part Poles, and the Ruthenians are less in number than the Germans. In the Middle Ages Lemberg also was a German outpost. There is a university and a technical school. The manufactures have only local importance. Between Cracow and Lemberg lies *Tarnów*, on the Dwnajec, and *Przemysl*, a strong fortress, which defends the eastern Beskids, on the San. On the two lines from Lemberg to Russia the chief towns are *Brody* and *Tarnopol ;* the continuation of the main line to the south-east passes through *Kolomea*, on the Pruth, and reaches the Russian and Rumanian frontier near *Czernowitz*, a somewhat new town on the right bank of the Pruth, which is the capital of Bukovina. It has importance as a local centre, and as a frontier place. Its population is more mixed than that of any other town in Austria ; Jews, Greek Christians, and Roman Catholics are nearly equal in number ; the German language predominates, and is used in the university, which was founded in 1875.

The Dinaric Lands.—The narrow strip of the Dinaric lands which forms the Austrian coast is accompanied by a mountain range, 5,000 to 6,000 feet in height, which consists of limestone, and shows all the irregularities of the Karst phenomena. Deep valleys are wanting, and only one fairly long river from the interior, the Narenta, reaches the sea. A low foreland forms the peninsula of Istria. Farther south there are some low grounds in the middle of the Dalmatian coast, on both sides of

which rows of long islands follow the coast, the ridges of a drowned land. The northern part of the coast extends along the Karst, which continues the mountain range at a height of only 2,000 feet; and a small part of the Plain of Lombardy, at the mouth of the Isonzo, belongs also to Austria.

FIG. 156.—*The Karst. The map measures* 300 *miles by* 150. *Karst region, white; Adriatic drainage, black; Danube drainage, stippled.*

The climate of the Austrian coast, which stretches between 45° 45′ and 42° N., is truly Mediterranean. The winters are warm and relatively rainy, the summers are hot and dry. In the north, especially along the Karst, the Bora is a frequent cold and dry wind coming from the interior, and the charms of the Mediterranean climate can only be enjoyed at places like Abbazia, which are sheltered from it. The south wind, called Scirocco, is warm and moist; the sudden changes between Bora and Scirocco are consequently very disagreeable. The evergreen bushes and trees, and the culture of the olive reach from the sea to 600 and 1,000 feet. The higher slopes are bare rock, and the growth of trees is hindered by the strength of the Bora and the heavy rain showers of the Scirocco. The mean annual precipitation, which is at the coast above 40 inches, rises here to 80 inches, and at several places even to 200 inches. The forests have often been devastated by reckless wood-cutting.

Resources and People of the Dinaric Lands.—The configuration and the soil of the Austrian Coast-lands do not favour agriculture. Only one-eighth of the land is arable; the olive gardens and vineyards are nearly as extensive. In the north, near the mouth of the Isonzo, mulberries are cultivated for silkworms. Nearly one-half of the ground serves as pasture for sheep, and especially goats. The mineral wealth is confined to some coal-beds in Dalmatia: excellent building stone is quarried in Istria; the Brionian islands, near Pola, furnished the marbles of Venice. The sea affords a rich fishing-ground, resorted to by 11,000 fishermen. The trade in fish with the interior suffers, however, from the want of means of communication.

The population of the maritime provinces, consisting of the County of Gorizia, the Territory of Triest, the Margravate of Istria, and of the Kingdom of Dalmatia has a density of 168 per square mile, much below the average. The greater number of the people (68 per cent.) are Slavonic, in the north Slovenians, in the south Croats and Servians. In the harbours, and along the coast of the maritime provinces, descendants of the old Roman population still exist, refreshed by Italian colonists. Nearly 30 per cent. of the inhabitants are Italians, and Italian is the language along the sea. The German element forms little over 1 per cent.

Coast Towns.—The Austrian coast has many excellent ports along

the Dinaric Mountains, but most of the deep and sheltered bays have no importance, since there are no practicable ways from them into the interior. That part of the coast, however, which can be easily reached from the other Austrian provinces over the Karst has no good harbour. *Triest* lies on the slope which rises directly to 1,000 feet round an open bay. The ancient Greeks had a settlement (Tergeste) on this site, but its development as a harbour dates only from the decay of Venice, when Austria began to make efforts for maritime power. By the foundation of the Austrian Lloyd Steamship Company, and since the opening of the railway, which ascends the Karst in a long loop, Triest became a port of international importance, but being exposed to the full force of the Bora, and having only one mountain railway to the interior, notwithstanding many improvements, it has not the rank which the country deserves for its chief seaport, and the trade of the whole north of Austria gravitates to German ports. The population of Triest does not increase as much as that of other Austrian cities ; it is mainly Italian. The great military port of Austria, *Pola*, lies on a deep and sheltered bay near the south point of the peninsula of Istria, from which the neighbouring coasts can be easily defended. The capital of Dalmatia, *Zara*, is a port of local value on the Dalmatian lowlands. In the south, *Ragusa* was in the Middle Ages the chief harbour of the whole Dinaric coast ; now it is a dead place, but there is a narrow-gauge railway to the interior of Hercegovina and Bosnia.

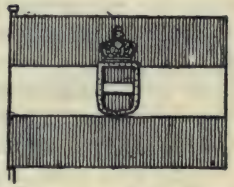

FIG. 157. — *Austro-Hungarian Naval Ensign.*

The shores of Dalmatia are amongst the most beautiful of Europe. They combine the steepness of the Norwegian coast with Mediterranean scenery and the picturesque relics of an old civilisation. Nothing can be compared with the deep narrows (*bocche*) of *Cattaro*, where the sea penetrates in several basins among cliffs of 6,000 feet in height. At *Spalato* a whole town is built in the ruins of the palace of the Roman Emperor Diocletian (whence, indeed, the name of *palace* is derived). Palms grow on some of the islands, especially at Lissa. Dalmatia will one day become a favourite haunt of tourists, and its sheltered towns will be prized as winter resorts. But it is still very isolated, and its inhabitants extremely ignorant, only 31 per cent. of them being able to read and write. *Abbazia*, near Fiume, and the island Lussinpiccolo, are winter stations.

III.—HUNGARY

By Dr. Béla Erödi,
President of the Hungarian Geographical Society, Budapest.

Position and Extent. — The Kingdom or State of Hungary (*Magyarország*=Land of the Magyars) lies about the middle of the southern half of Europe in the basin of the Danube, between the same parallels of

latitude as France, north of Bordeaux. Its form resembles a semicircle, and excepting a small part of the western side, it is separated on three sides by natural boundaries from the neighbouring lands. On the west, north and north-east these are hereditary provinces of Austria, which form with it one monarchy; on the south-east and south Rumania and Servia, on the south-west the occupied provinces of Austria-Hungary. Hungary is a continental country; only on its extreme western boundary does a small portion of it touch on the Adriatic Sea. The natural boundaries are formed on the west, north-west, north, north-east, east, south-east and south by the mighty range of the Carpathians, then on the south by the Danube, the Save and the Unna, and finally on the west by the Leitha (*Lajta*) river and Leitha hills, which separate it from Austria.

Configuration of Surface.—Hungary is surrounded for more than 1,000 miles by the immense curve of the Carpathians, which, starting from the gate of the Danube at Dévény (near Pozsony) sweep round one-half of the country from west, through north and east, to south, where they again reach the Danube at the so-called Iron Gates (*Vaskapu*) near Orsova. This great range of mountains is divided into three principal sections forming the north-western, the north-eastern, and the south-eastern highlands. The most interesting of the mountains is the High Tatra (*Magas Tátra*), in the north, a picturesque high mountain group, without any foot hills. Its loftiest peaks are those of Lomnicz, more than 8,600 feet high, and Gerlachfalva (named since 1896 Ferencz József Peak), 8,737 feet, the highest mountain in Hungary. These are all bare rocks, on which in some places snow remains even in summer; and in their hollows more than a hundred small mountain tarns, the fairy-like "eyes of the sea," attract many visitors to this splendid mountain wilderness. The most extensive members of the Carpathian system are the south-eastern highlands, which form one grand natural fortress, through which there are few passes. The Vereczke Pass, in the north-eastern frontier range, is famous in history as that by which the Magyars entered the country in the year 898. The offshoots of the mountain system of the Alps, which enter Hungary, are divided into three chief groups. Between the Danube and the Drave, the eastern offshoots of the Noric Alps, between the Drave and the Save, the last spurs of the Carnic Alps, and finally between the Save and the Adriatic the eastern continuation of the Julian Alps. In the space surrounded by the Carpathians and the Alps stretch two level expanses of land—the Little and the Great Hungarian Plains. The *Little Hungarian Plain* (*Kis-Alföld*) lies in the western part of the country, upon the islands and both sides of the Danube from Pozsony to Esztergom. Its extent is about 5,000 square miles; the lowest portion of it is the Hanság, between the Fertö (*Neusiedler*) lake and the Rábcza river. This plain, called also the Pozsony basin, is exceedingly fertile. Coming through the passes of the Danube at Vácz from the small plain, we reach the *Great Hungarian Plain*, the most characteristic part of the country, lying in the centre of

the land and bounded by the Carpathians on one side and the Lower Danube on the other. It occupies about 30,000 square miles. The Tisza (*Theiss*) traverses its greatest length. This plain, appearing as an unending, and for the most part uniformly flat surface, is not so monotonous as it appears upon a map. Its surface is undulating ; rows of mounds and sand-dunes are frequent, in many places there are deep hollows which are damp and impregnated with alkaline salts, in other parts there are marshes. But in general the plain is very fertile, ploughed fields stretch to the horizon, and the immense pasture-grounds are filled with herds of horned cattle, horses, sheep and swine. The villages, fringed by rows of shady trees, especially acacias, stand at great distances apart, but are large and populous, and are transversed by State, county and communal roads and railway lines.

Hydrography.—Most of the rivers belong to the Danube system ;

FIG. 158.—*The Chief Canal at the Iron Gates.*

only two streams having their sources in the High Tátra flow to the Vistula. The *Danube* (*Duna*), which is the principal waterway of Hungary, traverses the country for almost 600 miles, forming several large islands in its course, of which the most important are Csallóköz and Szigetköz between Pozsony and Komárom, the first formed by a branch on the left, the second by a branch on the right of the main stream. The island of Szent Endre is above and that of Csepel below the capital. The Danube is navigable by steamships ; the rocky bed of the Iron Gates, which was dangerous to navigation, has been cleared and all obstacles removed by the Hungarian Government. Tributary streams of the Danube on the left hand are the Morva (forming in part the Austrian boundary), Vág, Garam, Ipoly, Tisza, Temes ; on the right side the Lajta (Leitha), Rába, Kapos, Drave (which receives the Mura) and Save. The *Tisza* is the one great truly Hungarian river, as it rises and ends in

the country. In the Hungarian coat-of-arms four silver stripes represent the Danube, the Tisza, the Drave and the Save (Fig. 159.) Hungary contains only two large lakes, the *Balaton* and the Fertö, both on the right side of the Danube. The Balaton (or Platten lake) has an area of 230 square miles, and stands 420 feet above sea-level. It is separated into two parts by the mountainous peninsula of Tihany. On its banks mineral springs of acid water burst out at Balaton-Füred, which is a celebrated watering-place. The lake is commonly called the *Hungarian Sea*, and its shores are much cultivated. The *Fertö* (or Neusiedler lake) has an area of 110 square miles, and stands 370 feet above sea-level, but its surface is not permanent. Between the streams there are many canals for navigation. Mineral waters are abundant in many places.

Resources of Hungary.—More than 97 per cent. of the soil of Hungary is productive, and about half of this is arable land. The plains, the land between the Danube and the Drave, and between the Drave and Save are covered with black, yellow, and sandy earth, which, in the highlands, is mixed with gravel. The alluvial and diluvial deposits in the plains form good soils for the growth of wheat, rye, barley and maize, the crop of which not only supplies the country but furnishes a great export. The mountains are chiefly formed by granite, upon which rest crystalline schist formations. The Carpathian sandstone is widely distributed. The mountains conceal many mineral treasures, which have been mined from very early times. Iron-ore is very abundant ; the mountains of Transylvania produce much gold ; silver, copper, cobalt, nickel, mercury, zinc and lead are found in varying quantities. A special product of the country is the noble opal, which is found in the trachyte beds near Vörösvágás. Salt is found in immense abundance in Transylvania and Máramaros. There is plenty of coal and lignite, and petroleum is also worked. The mountainous districts are covered for the most part with forests ; the woods occupy 30 per cent. of their area, in contrast with only from 1 to 5 per cent. of the plains. The export of timber is important. The most common trees are the oak, poplar and acacia. Fruit trees are largely cultivated, and Hungary furnishes apples, pears, and plums for export. Wine production is of great importance, for the grape grows and ripens well almost everywhere. Cattle breeding has not received as much attention as agriculture, though lately the breeding of horned cattle, horses and swine, has shown improvement. The bear, fox, wolf, badger, wild cat and lynx, the roe, red deer, wild swine and wild goat are common in the immense forests.

Climate.—As Hungary, excepting one small portion on the Adriatic Sea, lies far from the ocean, the climate is moderately continental. Three types may be distinguished—that of the mountain districts, of the plains and of the sea-coast. The winter is in general very cold, especially in the great plain and in the inner basin of Transylvania ; the summer is hotter than in western Europe in the same latitude. In the highlands the climate is very variable, but snow does not lie in summer, except in some hollows

of the High Tátra. The rainfall is very capricious. Most falls, on the average, in spring and autumn in the north and north-eastern highlands, and in the Transylvanian mountains; and less in the Great Plain. The yearly rainfall in the Carpathians is on an average 40 to 50 inches, while on the Great Plain it is 20 to 25 inches. The most cloudy season is spring. In summer the *délibáb*, or Fata Morgana, is a very charming and everyday phenomenon, which on tranquil, warm days rises about noontide, and like a resplendent sea spreads over the heated plain as far as the eye can reach. Fiume has a very dry summer and a very rainy autumn and winter; strong north and north-east winds (*bora*) prevail.

History.—The territory of the present kingdom of Hungary was a great highway of nations. At the earliest period after the Romans came the Huns, under King Attila, after whose death the empire fell in pieces. After German people came the Avars, an Asiatic nation, which inhabited this land for two and a half centuries, until Charlemagne broke their power. The Hungarians, who lived in the earliest time in Asia, between the Lower Irtish and the Ural, and later between the Lower Dnieper and the Don (Lebedia), penetrated in 898, under the leadership of Árpád, through the pass of Vereczke into their present country, and settled in it after subduing the different nations of the land. The house of Árpád reigned till 1301. Stephen, the first king, converted the nation from heathenism to Christianity, was crowned in 1000, and organised the Hungarian State according to western patterns. The Hungarian State attained its greatest area under King Nagy Lajos (fourteenth century), and under King Mátyás, surnamed the Just, it came to the climax of its glory, both military and political. In 1526, after the catastrophe of Mohács, where the Hungarians were defeated by the Turks, the Habsburg dynasty succeeded, and Transylvania was created a separate principality under national princes. The Turks occupied a great portion of the land and were not finally expelled for nearly two hundred years. In 1723 the Hungarian Parliament accepted the Pragmatic Sanction, which established the succession of the female line of the Habsburgs. In 1848 laws were enacted which abrogated the old constitution, introduced parliamentary government with a responsible national ministry, reunited Transylvania to the mother country, abolished all agrarian burdens, asserted the freedom of the press and the complete legal equality of the recognised religions, and made many important reforms. Events, however, necessitated a fresh struggle with Austria, which, by the help of a large Russian army, imposed a period of absolute government on Hungary for eighteen years.

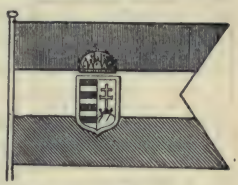

FIG. 159.—*Hungarian State Flag.*

The constitution of 1848 was restored by King Francis Joseph in 1867. That year was the beginning of a new era, and since then progress in every department of national life has been rapid. In virtue of the

Hungarian Constitution the Apostolic King of Hungary, whose person is sacred and inviolable, shares legislation as a joint right with the parliament, which he summons for a term of five years. The House of Commons consists of 413 representatives chosen by Hungarian districts, and of 40 deputies of the Croatian-Slavonian Diet. Members of the House of Magnates sit in virtue of inherited right, office, or dignity, or by nomination or election. The Royal Hungarian Cabinet consists of the president of the council and of nine Ministers, including the Croatian-Slavonian Minister without a portfolio. In virtue of the Pragmatic Sanction, Hungary and Austria are independent States allied with each other, but preserving their own sovereignty undiminished, with separate and independent State administration. But by the personal identity of the ruler, they form for mutual protection one monarchy. For the management of the common affairs 60 delegates, who meet alternately at Budapest and Vienna, are chosen by each parliament, the Hungarian Parliament selecting 40 members from the House of Deputies and 20 from the Magnates. The contribution for common expenses is arranged by mutual agreement for ten years at a time ; the actual quotas are 30 per cent. for Hungary and 70 per cent. for Austria.

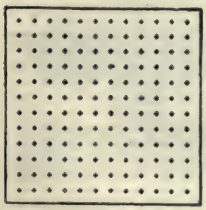

FIG. 160.—*Average population of a square mile of Hungary.*

People.—The people of Hungary are composed of several nationalities, all together forming the Hungarian nation. The Hungarians proper, or Magyars, are the leading element, for although they form only about one-half of the population, 80 per cent. of the people speak the Hungarian language—a proportion which is increasing every year. It must be particularly stated that the Hungarian race who conquered the country and created the kingdom take the leading position also in intelligence; and far from oppressing the other nationalities, they allow to all the same rights and privileges. Besides Hungarians there are (in order of their number) Serbo-Croats, Rumanians or Walachians, Germans, Slovaks and other nationalities, whose number together does not amount to more than a million. According to religion, the greatest part of the population belongs to the Roman and Greek Catholic Churches; then follow the non-united (or schismatic) Church, the Protestant Churches of Calvinist and Lutheran confession ; finally the Unitarian confession and the Jews. The Roman Catholics, the United Greek Church, and the Armenian Catholics are under the authority of the Pope in Rome. The king must belong to the Roman Catholic faith.

The people of Hungary live chiefly by agriculture, the breeding of live stock, and mining, to which occupations they are directed by the nature of the soil. They have no great inclination for industry ; therefore the imports are almost double the value of the exports. Though trade makes great progress by the increasing extension of railways, the want

of corresponding capital and enterprise allows many natural resources of great value to lie undeveloped. Yet material and intellectual progress is remarkable. At the census of 1890, 61 per cent. of the male and 46 per cent. of the female population above the age of six years could write and read. Higher instruction is provided by three universities, namely, at Budapest, Kolozsvár, and Zagreb, and many colleges for higher training in special subjects. The supply of secondary schools is better than in Austria, and approaches to that of some States of Germany. The pharmaceutical, philosophical and medical faculties of the universities are open to ladies. Great progress is made in the provision of technical schools. As for the administration, Hungary (the mother-land) is divided into 63 counties (*vármegye*), at the head of which stand the prefects (*föispán*) and deputy-prefects (*alispán*). Croatia-Slavonia numbers eight counties. Hungary is well supplied with railways; more than three-quarters of the whole Hungarian system belong to the State or are under the management of the Hungarian State Railways. The present tariff for passengers, the so-called zone system, was inaugurated in 1889, according to which the long distance is divided into fourteen zones, and the price is regulated by sections. In the zone tariff the longest journey, from 140 miles to any distance which can be traversed in twenty-four hours, costs only $5 first-class, which is the maximum fare for any journey in the kingdom.

Hungary Proper.—*Budapest* is the capital and residence-town of Hungary, situated in a splendid position on both sides of the Danube, a short distance below its great bend from an eastward to a southward course, surrounded on the right bank by picturesque hills, the offshoots of the Alps. One of these hills which dominates the city is the site of the Royal Palace, and another, named Mount St. Gerard (*Szent Gellérthegy*), rises abruptly from the Danube to a height of 720 feet above sea-level. The left bank of the Danube is a plain. Buda on the right and Pest on the left side formed, before 1873, two towns with separate administrations, but are now united. They are connected by several bridges for passengers and two railway bridges. The town is the residence of the king, who is understood to reside there for half the year; it is the seat

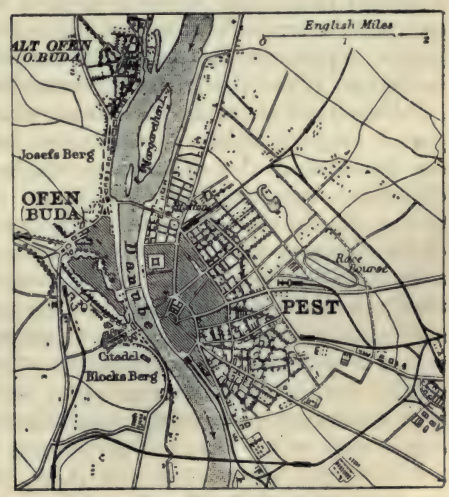

FIG. 161.—*Budapest.*

of government, of the parliament and of the supreme courts. It has many public institutions, including the Hungarian Academy of Sciences, the National Museum, with rich collections in different branches, and the National Picture Gallery. Budapest has a university, a polytechnic, many colleges, technical schools, and learned societies. It is also the centre of the commercial as well as of public and intellectual life of the kingdom. The population is increasing rapidly, at the average rate of about 10,000 a year. The town presents a very animated appearance, with the electric tram-lines which intersect it in all directions, and the great steamer traffic on the Danube. The boulevards and ring-streets and the colossal new buildings testify to the enthusiastic spirit in which the improvement of the city is carried on with reference to art as well as material progress. Amongst them the new Royal Palace, the new Parliament House on the left bank of the Danube, modelled after the Parliament Houses in London, the new Palace of Justice, and many of the theatres and churches may be mentioned as of conspicuous merit. Budapest has many hydropathic establishments with hot mineral springs. The fairy-like Margaret Island, the property of the Archduke Joseph, but used as a public park, and the hilly environs of Buda are charming places of popular resort.

Szeged, Debreczen and Arad are the chief towns of the Great Plain. *Szeged*, on the bank of the Tisza, has been rebuilt and improved since the great inundation of 1879, which destroyed the whole city. *Debreczen*, a railway centre east of the Tisza, is a large provincial centre of commerce, industry, and intellectual life. It is situated in the Hortobàgy puszta (steppe), the most important part of Hungary for cattle and horse-breeding. Debreczen has been termed "Calvinist Rome," as most of its inhabitants are of the Calvinist confession and the town takes a leading part in religious affairs. *Arad* is a fine, intelligent, and commercial town on the shore of the river Maros, which comes from Transylvania and discharges near Szeged into the Tisza. *Pozsony* (*Pressburg*) is one of the most cultivated provincial towns, and, after Budapest, the handsomest city of the country. It is situated on the Danube in a very fine position close to the Austrian border, and was the seat of the Hungarian Parliament until 1848, and since 1526 the place of coronation of the kings. *Kassa* is the most considerable town of Upper or northern Hungary, an ancient royal free town, with an interesting cathedral, the finest Gothic church in the country, built in the years 1290–1382. *Székesfehérvár* (*Alba Realis*) is the most flourishing commercial town in the Trans-Danubian region (*i.e.*, the region west of the Danube), the earliest coronation and burial-place of the Hungarian kings. *Esztergom* (Latin, *Strigonium*; German, *Gran*), on the right bank of the Danube, above its great bend to the south, is a picturesque city, the seat of the Prince-primate, the ecclesiastical chief of Hungary.

Kolozsvàr (*Klausenburg*), situated on the banks of the river Szamos, is the capital of Transylvania (*Erdély*), after Budapest, the first centre of

intellectual and public life of Hungary. It has a university, a remarkable museum, three colleges (a Roman Catholic, a Calvinist, and a Unitarian), and is the seat of the Calvinist and the Unitarian bishops of Transylvania. It was the birthplace of Mátyás (Matthias Corvinus), the greatest king of Hungary. *Gyulafehérvár* (*Karlsburg* the Roman *Apulum*), near the river Maros, was the ancient residence of the princes and is the seat of the Roman Catholic Bishop of Transylvania.

Croatia-Slavonia and **Dalmatia** form a self-governing political unit inside the dominion of Hungary, and on that account bear the name of *Borderland* (*Partes adnexæ*). Despite this legal and correct triple designation, Dalmatia, which at the beginning of the twelfth century was united to Hungary by King Kálmán, now belongs only *de jure* to Hungary and the Borderlands, while *de facto* it is united to Austria. Croatia was united to Hungary under Kings Ladislaus and Kálmán, and King Kálmán was the first, who in the year 1102 was crowned King of Croatia and Dalmatia. The local government is concerned only with home affairs, religious service and public instruction, and justice. Croatia-Slavonia has a National Assembly of one Chamber, which consists of 90 elected deputies, and of personal voters holding a privileged position. It is represented in both Chambers of the Hungarian Parliament.

Zagreb (Hungarian, *Zágráb*; German, *Agram*), near the Save, is the seat of the Banus (governor), of the Roman Catholic Archbishop of Croatia, and of the Diet (National Assembly). It has a university, academy of sciences, museum, and a remarkable late Gothic cathedral of the fifteenth century, recently restored after an earthquake, which damaged it seriously.

Fiume and its Territory, annexed to Hungary in 1779 by Queen Maria Theresa as a separate body (*corpus separatum*), is represented in the Hungarian Parliament, but administered by a special governor. The town of *Fiume* lies in the north-east corner of the Gulf of Quarnero, in the Adriatic Sea. It was formerly an insignificant fishing village, but since its union with Hungary it has developed into a considerable seaport and a commercial town of the first rank, a notable rival of the Austrian Triest. Fiume has three good harbours, one the petroleum harbour. Whitehead's torpedo factory, a great paper factory, petroleum refineries, and rice-mills, give it considerable industrial importance. Fiume is the residence of the Governor, of the Imperial and Royal Marine Academy, and of a Royal Mercantile Marine Academy. The greater part of the inhabitants speak Italian, which is the recognised official language of the territory.

IV.—BOSNIA AND HERZEGOVINA

By Prof. A. Penck.

Bosnia and Herzegovina.—The hinterland of Dalmatia, nearly the whole north-west of the Dinaric lands, is "occupied and administered" by Austria-Hungary. It is a mountainous country; the west consists of limestone, which is partially bare, and reaches at several points to from 6,500 to 7,500 feet. Between the ridges there are numerous broad basins called *Poljes*, which are drained by subterranean channels and are inundated during the wet season. In the east slates and sandstone prevail; the mountains are covered there with dense forests, which extend over one-half of the country; they contain iron ores, and silver at several places. Coal and salt are found in broad basins along the rivers. The west, embracing Herzegovina, has a Mediterranean climate in the valleys. It is drained by the Narenta to the Adriatic Sea. The east, Bosnia proper, has severer winters and cooler summers; rain occurs at all seasons. It is drained by the Una, Vrbas, Bosna and Drina to the Save, and belongs in all respects to the lands of the Danube.

Bosnia and Herzegovina formed, before the conquest of the Turks, a separate kingdom, and from an ethnographical point of view they are still uniform. Their inhabitants belong to the Croatian branch of the Southern Slavs, but they are diversified by religion. Forty-three per cent. are Christians of the Eastern Church, called Servians; 20 per cent. are Roman Catholics, called Croats; and 37 per cent. are Mohammedans, called Turks, though there has been only a very insignificant Turkish immigration. The landowners, or *Begs*, are mostly Mohammedans; the tenants, or *Kmets*, are Christians. This state of things has not been changed since the occupation, but the old system of despotism has disappeared, and the country, which twenty years ago had only bridle-tracks, has now an extensive network of excellent public roads, and some narrow-gauge railways, by which it is connected with Hungary and the mouth of the Narenta. Different manufactures are now established; mining is going on; there are iron and salt works, and even paper mills. The population is growing rapidly; and the average density of the population has increased from 59 in 1879 to 68 in 1885. The exports are wood, especially oak, plums and cattle. *Sarajevo*, formerly called Bosna Serail, is the flourishing capital, lying in a basin of the Upper Bosna, surrounded by high mountains. The chief place of Herzegovina is *Mostar*, on the Narenta.

STATISTICS OF AUSTRIA-HUNGARY.

(Without Bosnia and Herzegovina.)

	1880.	1890.	1900.
Area of Austria-Hungary (square miles)	240,942	240,942	240,942
Population „ „	37,883,609	41,358,886	45,242,889
Density of population per square mile	157	171	187

THE PEOPLE OF AUSTRIA-HUNGARY BY LANGUAGE (1890).[1]

	Austria.	Hungary.	Total.
German	8,461,000	2,107,000	10,568,000
Chech, Moravian, and Slovak	5,472,000	1,910,000	7,382,000
Polish	3,719,000	—	3,719,000
Ruthenian	3,105,000	383,000	3,488,000
Slovenian	1,176,000	94,000	1,270,000
Servian and Croatian	645,000	2,604,000	3,249,000
Italian and Ladin	675,000	—	675,000
Rumanian	209,000	2,592,000	2,801,000
Magyar	8,000	7,426,000	7,434,000
Gypsies	—	82,000	82,000
Total	23,895,000	17,463,000	41,358,000

AVERAGE ANNUAL TRADE OF AUSTRIA-HUNGARY (*in pounds sterling*).

	1876–1880.	1880–1885.	1891–1895.
Imports	46,861,000	51,525,000	55,491,000
Exports	54,609,000	60,448,000	64,205,000

STATISTICS OF AUSTRIA.

	1880.	1890.	1900.
Area of Austria (square miles)	115,925	115,925	115,925
Population of Austria	22,144,244	23,895,413	26,150,597
Density of Population (per square mile)	192	207	226

POPULATION OF AUSTRIAN TOWNS.

	1880.	1890.	1900.		1880.	1890.	1900.
Vienna	1,112,025	1,364,548	1,674,957	Triest	144,844	157,466	134,143
Prague	177,026	182,530	201,589	Brünn	82,600	94,462	109,346
Lemberg	109,746	127,943	159,143	Cracow	66,095	74,593	91,323
Graz	97,791	112,069	138,080	Czernowitz	45,600	54,174	67,622

THE LANDS OF THE AUSTRIAN CROWN.

	Area Sq. Miles.	Inhabitants. 1880.	1890.	1900.	Mean Density per Square Mile. 1880.	1890.	1900.
Lower Austria	7,654	2,330,621	2,661,799	3,100,493	303	347	405
Upper Austria	4,627	759,620	785,831	810,246	163	170	175
Salzburg	2,762	163,570	173,510	192,763	60	62	69
Styria	8,659	1,213,597	1,282,708	1,356,494	140	148	156
Carinthia	3,988	348,730	361,008	367,337	88	91	92
Carniola	3,844	481,243	498,958	508,150	124	129	132
Tirol & Vorarlberg	11,307	912,549	928,769	981,949	80	83	86
Alpine lands	42,841	6,209,930	6,692,583	7,327,282	145	156	171
Bohemia	20,058	5,560,819	5,843,094	6,318,697	277	293	315
Moravia	8,580	2,153,407	2,276,870	2,437,706	251	264	284
Silesia	1,987	565,475	605,649	680,422	282	306	342
Boian lands	30,625	8,279,701	8,725,613	9,436,825	270	285	308
Galicia	30,307	5,958,907	6,607,816	7,315,816	196	218	241
Bukovina	4,032	571,671	646,591	730,195	142	161	181
Carpathian lands	34,339	6,530,578	7,254,407	8,046,011	190	211	234
Maritime Provinces	3,077	647,934	695,384	756,546	210	225	249
Dalmatia	4,956	476,101	527,426	593,783	96	106	120
Dinaric lands	8,033	1,124,335	1,222,810	1,350,329	140	152	168

STATISTICS OF HUNGARY.

	1880.	1890.	1900.
Area of the Hungarian Crown Lands, square miles	125,039	125,039	125,039
Population of Hungarian Crown Lands	15,739,375	17,709,375	19,254,550
Density of population, per square mile	126	139	153

[1] From *The Statesman's Year Book.*

POPULATION OF HUNGARIAN TOWNS.

	1880.	1890.	1900.
Budapest (without military)	360,551 ..	505,763 ..	732,322
Szeged	73,675 ..	87,410 ..	102,991
Szabadka (Maria Theresiopol)	61,367 ..	73,526 ..	82,122
Debreczen	51,122 ..	58,952 ..	75,006
Pozsony (Pressburg)	48,006 ..	56 048 ..	65,867
Zagreb (Agram)	28,388 ..	40,268 ..	61,002
Kolozsvár (Klausenburg)	29,923 ..	34,858 ..	49,295
Fiume and territory	20,981 ..	30,337 ..	38,955

STATISTICS OF THE HUNGARIAN CROWN LANDS.

	Area square miles.	1880.	Population. 1890.	1900.	Density of Population. 1880.	1890.	1900.
Hungary, with Transylvania	108,258	13 812,446	15,232,159	16,838,255	127	139	155
Croatia and Slavonia	16,773	1,905,295	2,200,977	2,416,304	113	130	147
Territory of Fiume	8	20,981	30,337	38,955	—	—	—

(For analysis of population according to language see Statistics of Austria-Hungary.)

STATISTICS OF BOSNIA AND HERCEGOVINA.

	1879.	1885.	1900.
Area of Bosnia and Hercegovina (sq. miles)	19,734 ..	19,734 ..	19,734
Population „ „ ..	1,158,453 ..	1,336,091 ..	1,568,092
Density of Population	59 ..	68 ..	80

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CHAPTER XIX.—THE DANUBIAN AND BALKAN STATES [1]

By Dr. A. Philippson,
Lecturer on Geography in the University of Bonn.

I.—RUMANIA

Position and Boundaries.—The great mountain chain of the Carpathians on the east of Transylvania runs from north to south, turns at right angles towards the west, as the Transylvanian Alps, and again towards the south at the point where the Danube breaks through it in the gorge of the Iron Gates, and there the chain enters the Balkan Peninsula. The Carpathians form the western boundary of Rumania towards Hungary. The country includes the low plain on the east and south, which is physically part of the great plain of Russia. On the north the boundary is an artificial line towards Bukovina; on the east the river Pruth separates Rumania from Russia, and on the south the Danube is the boundary towards Bulgaria. Rumania also includes the delta of the Danube and the district of the Dobruja, the coast of which is a low plain, bordered by lagoons on the Black Sea. Thus the country is the gate of the Balkan Peninsula towards Russia, stretching as it does from the Carpathian barrier to the Black Sea. Together with Russia it commands the mouths of the Danube, and with Bulgaria the lower course of that river, the greatest channel of inland navigation in Central Europe.

Surface and Resources.—The great wall of the Carpathians, which rises in several summits above 8,000 feet, slopes down to the Rumanian plain in beautiful wooded declivities cut by the valleys of numerous rivers fed by the high rainfall of the region. The foot-hills of recent Tertiary formation contain important deposits of rock salt and petroleum springs. The province of *Moldavia* occupies the eastern foreland and forms a tableland sloping to the south, covered with the black earth of the steppes, and trenched deeply by the steep-walled valleys of the Sereth, the Pruth and other tributaries of the Danube. The province of *Walachia* occupies the southern slope from the Transylvanian Alps. It forms a low plain of pebbles and clay, which is crossed by the broad, flat valleys of rivers flowing southward or south-eastward to the Danube. The most important of these rivers is the Aluta, which rises in Transylvania and breaks through the Transylvanian Alps. The left bank

[1] Translated from the German by the Editor.

of the Danube, which is here divided into numerous branches, forms a perfectly flat, marshy, alluvial plain, so that the river can only be approached at a few points, and there are very few towns upon it. The right or Bulgarian bank, on the other hand, is high and forms the site of several towns. The higher steppe-like plateau of the Dobruja causes the Danube to turn northward, and where it resumes its easterly course the delta, a mere wilderness of swamps, begins at once. The most important mouths are, from north to south, those of Kilia, Sulina, and St. George; the Sulina mouth is that used by shipping, silting being overcome by engineering works. The Dobruja and south-eastern Walachia are mainly pastoral Steppes; the rest of the Rumanian plain is very fertile, especially for grain. In the hill-zone fruit and excellent wine are produced; while in the mountains cattle-rearing and forestry are more important.

FIG. 162.—*The Mouths of the Danube.*

Climate.—In climate, as well as in soil, Rumania belongs to the region of the Russian Steppes. The winters are very cold, the temperature may even fall as low as −20° F.; the summers are hot, the range of temperature being great. The rainfall is small and irregularly distributed throughout the year. It is heaviest in early summer (June), while the later part of summer is very dry. The mean temperature of the year at Bukarest is 51°, that for July 73°, and the extreme temperatures of the year are −6° and +94°.

History.—The Rumanian region was inhabited in ancient times by the Thracian tribe called Dacians, and formed a part of the Roman province of Dacia. When or how the Rumanian people, who speak a language closely allied to Latin, and call their country *Romana*, took their rise is doubtful. Some believe that they were originally Roman colonists, others that they were Romanised natives of the Balkan peninsula, who came into the country in the Middle Ages. The independent principalities of Moldavia and Walachia date from the thirteenth century; but later they came under the power of Turkey. During the nineteenth century Russian influence has been gradually increasing. The efforts of the Rumanian people to secure their independence of both Powers led, after the Crimean War, to the union of the two principalities in 1859. By the Berlin Treaty of 1878 Rumania was obliged to give up Bessarabia to Russia, but received in return the Dobruja, and attained complete independence of Turkey. In 1881 it was declared a hereditary kingdom, the power of the king being

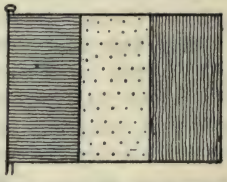
FIG. 163.—*The Rumanian Flag.*

limited by a Senate and a Chamber of Deputies representing the people.

People and Trade.—The great majority of the people belong to the Rumanian nation and the Greek Catholic Church; the remainder are nearly all Jews. The people live mainly by agriculture, the growing of wheat and maize being most important. Cattle-breeding also occupies a considerable part of the population; there is very little other industry except salt-mining and the extraction of petroleum. Rumania is one of the most important grain-growing countries in Europe, 73 per cent. of its exports being grain, and the rest consisting almost entirely of other farm produce. The exports, which are considerably less than the imports, go mainly to Belgium, the United Kingdom, Austria-Hungary, and Germany. The order of importance for imports is: Austria-Hungary, Germany, the United Kingdom, and France. The Danube shipping trade is of great importance to Rumania; the chief seaports are the mouths of the river, the navigation of which is under the charge of an international commission meeting in Galatz. The Pruth is also navigable for a considerable distance. The railway system, with Bukarest as its centre, is well developed. Three lines enter the country from Austria-Hungary; on the west at Orsova at the Iron Gates; from Translyvania by the Predeal Pass (3,400 feet high); and on the north-east from Lemberg through Moldavia. Two lines cross the Danube to Varna and Constantsa (Kustenji), on the Black Sea, with direct communication to Constantinople; and there are also two lines into Russia.

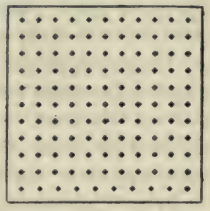

FIG. 164.—*Average population of a square mile of Rumania.*

Towns.—The capital is *Bukarest*, in the middle of the Walachian Plain on the small river Dimbovitsa. It is first referred to in history in the fourteenth century, and since the seventeenth century it has been the capital of Walachia. The town has quite a western appearance, and is indeed one of the most elegant cities of southern Europe. In every respect it is the intellectual centre of the Rumanian people, possessing a university and other educational establishments. Eighteen forts protect the capital. North of Bukarest, on the railway to Transylvania, *Ploesci* stands at the foot of the mountains. In western Walachia, *Craiova* is the most important town. In Moldavia the chief towns are the provincial capital, *Jassy*, situated near the Pruth, and *Botosani* in the extreme north. The principal commercial harbours, particularly for the export of grain, are *Galatz* and *Braila*, on the left bank of the Lower Danube, not far from the mouths of the Sereth and Pruth. *Constantsa*, the only harbour of the Dobruja, has recently acquired importance for trade with Constantinople.

STATISTICS.

	1887.	1899.
Area of Rumania (square miles)	50,700	50,700
Population	5,500,000	5,912,520
Density of population per square mile	109	116

POPULATION OF TOWNS.

	1876.[1]	1899.		1876.[1]	1899.
Bukarest	221,000	282,071	Braila	28,000	58,392
Jassy	90,000	78,067	Craiova	23,000	45,438
Galatz	81,000	62,678	Ploesci	33,000	42,687

ANNUAL TRADE (*in pounds sterling*).

	Average 1870–75.[2]	1881–85.	1891–95.
Imports	3,300,000	11,700,000	15,800,000
Exports	6,000,000	8,800,000	11,900,000

II.—THE BALKAN PENINSULA

General Features.—The Balkan Peninsula is the most easterly of the three great peninsulas of southern Europe, and, unlike the others, is united to the body of Europe along a long land boundary. In the west the Dinaric Alps and in the middle the Carpathians run into the peninsula which is bounded between them by the Hungarian Plain, and in the north-east by the plain of Rumania. The boundary of the Balkan Peninsula can best be drawn from the Gulf of Fiume to the source of the Kulpa, and along that river, the Save, and the Danube to the Black Sea.

From this border the peninsula stretches as a broad quadrilateral towards the south. The Black Sea coast on the east is for the most part a steep, low shore, the only sharp indentation being the Gulf of Burgas in the middle. In the south-east it almost touches Asia Minor, being separated only by the narrow river-like Strait of Constantinople (the ancient *Bosporus*), the small Sea of Marmora (*Propontis*), and the Strait of the Dardanelles (*Hellespont*). The south coast in the east is for the most part low and uniform, but in the west the deeply notched mountainous peninsula of Chalcidice projects and forms the Gulf of Salonica. The south-west corner is formed by the peninsula of Greece which is separately described. The west coast, facing the Adriatic, runs northward as a flat shore as far as the mouth of the Drin; thence, north-westwards to Fiume, it is mountainous, and bordered by a complicated series of long, narrow islands and peninsulas separated by straits and bays, and stretching for the most part parallel to the coast, a formation resulting from the partial submergence of a folded mountain region.

The great importance of the Balkan Peninsula depends upon the fact that the channels separating it from Asia Minor are so narrow that it forms a bridge between Asia and Europe, connecting the mountain structure of the continents, and interposing no barrier to plants and animals, or human

[1] These figures are estimates, not the results of a census. [2] No data for 1873.

movements. Through its channels it commands the communication between the Black Sea and the Mediterranean, and thus the "Eastern Question" has acquired its importance in modern European politics.

Configuration.—Two great systems of folded mountains penetrate the Balkan Peninsula from the north; one of these, the Balkan, occupies the north-eastern part; the other, the Dinaric Alps (called after Mount Dinara in Dalmatia), occupies the whole western portion. Between the two extends the ancient crystalline mass of the Thraco-Macedonian Highlands, forming the nucleus of the peninsula (Fig. 165).

The Balkan Region.—The Carpathians, turning southwards after having formed the boundary between Hungary and Rumania, are broken through by the Danube in a long picturesque gorge between Bazias and Turn Severin. The numerous rapids, the most dangerous of which is called the Iron Gates, were formerly a serious obstacle to shipping; but the difficulties have now been removed by blasting and canalising (Fig. 158). South of the Danube gorge the Balkan range begins as the immediate continuation of the Carpathians, and with a similar structure runs first southwards, and then east to the Black Sea, shutting in the Lower Danube Plain on the south. The first section of the Balkans, running southward, occupies eastern Servia; ranges of crystalline schist yielding iron, lead, and copper ore, alternate with broad, wild limestone ridges rising to 6,500 feet in height. The Central Balkans, on the contrary, form a long and nearly uniformly high central ridge, running eastwards, with rounded summits up to 7,800 feet in height. On the north this ridge is bordered by a broad zone of parallel folded chains of sedimentary rock which become gradually lower towards the plain. These bordering heights form the third or eastern section of the Balkans, after the main ridge has disappeared. The mountains sink gradually towards the north, but break away in steep slopes on the south to a series of fertile intermont basins of which the most important is that of Sofia. From the Sofia basin the river Isker flows northward, cutting through the Balkans in a narrow gorge. South of this series of basins several mountain masses rise parallel to the Balkan, and are named the Anti-Balkan; Mount Vitosha near Sofia is the most important of these.

The Bulgarian Foreland, stretching from the foot of the Balkans towards the north, is formed of horizontal Cretaceous and Tertiary strata, covered with the fertile earth of the steppes, and well cultivated. The north-running rivers flow through deep, steep-walled valleys across the plateau, which forms a high bank where it meets the Danube. From the ferries on the river roads cross the tableland, and the wooded foot-hills gradually rising to the great barrier of the main ridge which is crossed by numerous easy but very important passes. On this account the high bank of the Danube, the valleys which furrow the Bulgarian plateau, and the Balkan passes, are the natural defensive lines of the peninsula and have been the scenes of many great battles.

The Thraco-Macedonian Region.—In contrast to the younger folded mountains, the relief of the ancient highlands of crystalline rock in Thrace, Macedonia, and western Servia is of an extremely irregular character. Here and there rounded mountain masses rise to a great height, while in other places the land forms broad, flat, undulating hills; and the whole district is so penetrated by deep basins and river valleys that lofty mountains are often immediate neighbours of low plains. The valleys with their fertile soil naturally form the centres of cultivation and lines of communication, especially where several basins approach each other so as to form a continuous furrow. One of these which traverses the whole peninsula from north-west to south-east is known as the Diagonal Furrow. It is formed by the broad valley of the Morava, flowing northwards to the river Danube, through the fertile hills of Servia, from which low passes lead through the basin of Sofia to the great river Maritsa flowing to the Ægean Sea through the two most extensive basins of the Balkan Peninsula in the ancient province of Thrace. The first of these is the extremely fertile plain of Eastern Rumelia, which stretches along the south of the Balkans; and the second is the steppe-like basin of Adrianople, which reaches to the Marmora and Ægean Seas, and is separated from the Black Sea by the low range of the Stranja hills. This great diagonal furrow was used for the old road, as it is for the modern railway, from central Europe by Belgrade to Constantinople and Asia Minor. Another important furrow, followed by a road and railway, branches southward from the Morava valley over a low pass, and the river Vardar, flowing along it, traverses several basins in Macedonia to the Gulf of Salonica. These two furrows diverging towards the south are the greatest highways of traffic and of industry in the peninsula, and in all ages they have been the sites of the greatest centres of population. Between the two stretches the wild mountainous district of the Rhodope, which in the north reaches a height of almost 10,000 feet in the peaks of Rilodagh and Muss-

FIG. 165.—*Orographic Structure of the Balkan Peninsula.*

Alla. Upper Macedonia, west of the Vardar valley, contains the mass of Shardagh, the highest summit in the Balkan Peninsula, just 10,000 feet above sea-level. Both of these mountainous districts are intersected with numerous basins and fruitful valleys, some of which in Macedonia, particularly in the west near the Albanian frontier, contain large lakes.

The Dinaric Region.—The west of the peninsula is occupied by the broad folds of the Dinaric Mountains, which, continuous with the Alps in the north, turn south-eastward and then southward parallel to the coast through Dalmatia, Bosnia and Herzegovina, Montenegro and Albania, into the Greek peninsula. They consist of a great number of parallel chains for the most part of limestone formation, rising in places in jagged crests to more than 6,500 feet above the sea ; and in other places showing the peculiar features of the Karst, swallow-holes and subterranean channels abounding on account of the solution of the rock. Stony and barren plateaux separated by longitudinal valleys following strips of softer schistose rocks, are characteristic features. The rivers Narenta, Drin, and Semen, break through the chains in wild inaccessible ravines. Communication with the interior is exceptionally difficult, as a traveller from the coast has to cross a succession of high ridges and deep valleys ; and, to add to the physical difficulties, these barren mountain lands have always been the home of robber tribes.

The mountain barrier on the west walled in the important and easily accessible trade routes from Hungary, Asia Minor, the Ægean Sea, and the Lower Danube Plain, which have made the centre of the Balkan Peninsula a channel for trade, for the passage of armies and for the migration of peoples in all ages. This central part is rich in fertile plains, and mineral resources are not wanting ; so that the country is capable of supporting a dense and highly civilised population, were it not for the thousand years of confusion and misgovernment which have made it the least advanced part of Europe.

Climate and Productions.—The Balkan Peninsula exhibits several varieties of climate. The centre and the east coast, as far as the Bosporus, are intermediate between Central Europe and the south of Russia, with winters as cold and snowy as in the east of Germany or in the north of Norway, the temperature often sinking below zero F. ; the summers, on the contrary, are as warm as in the south of France. The rainfall is less on the east coast than in the interior ; June is the wettest month, but rain is fairly uniformly distributed throughout the year. On the Ægean coast the climate is that of the Mediterranean, with mild winters like those of the south of France ; the rainfall, especially on the south-east, is small, with a maximum in autumn and winter. The greatest contrast occurs between the interior and the west coast, which is exposed to the warm winds from the Adriatic and protected by mountains from the north-east ; the average January temperature, in the same latitude, is about 7° F. higher on the west than on the east. The rainfall on the Adriatic coast is heavy at all seasons,

especially in autumn. The typical Mediterranean vegetation of evergreen shrubs, olives, figs, oranges, and lemons, is luxuriant along the whole west coast, very poorly developed in the south, and altogether wanting in the interior, where the forests and fruits of central Europe take its place. In the east, particularly in the Adrianople Plain, there are steppes like those of Asia. The Balkan Peninsula is also a meeting-place for European, Mediterranean and Asiatic animals ; the wolf and bear are at home on the mountains, the jackal prowls over the southern plains, herds of buffaloes and Oriental fat-tailed sheep graze beside the ordinary European cattle ; but the camel has now almost disappeared.

People and History.—In ancient times the Balkan Peninsula was occupied by two Aryan races, the *Thracians* in the east and the *Illyrians* in the west ; the Vardar Valley between them was the dwelling-place of the *Macedonians* of mixed Illyrian, Thracian and Grecian stock. The *Greeks*, who settled on the coast as sailors and traders, gradually spread over the south-east of the peninsula as far as the Balkans, introducing the Greek language and culture, although Latin was afterwards adopted in the north. Under Roman and Byzantine rule the land prospered greatly, and in the time of the Eastern Roman Empire, Constantinople became the most renowned city in the world through its trade and industry. In the seventh century the *Slavs* from the north, pressing upon the declining empire, drove the Greeks back to the coast, the Romans into the distant mountains, and the Illyrians (the present Albanians) into the south-west of the peninsula. These Slavs consisted essentially of two peoples, the *Servians* in the west and the *Bulgarians* in the east : both accepted Christianity in the ninth century and gradually raised themselves out of barbarism into civilisation. The Bulgarians by the fourteenth century had made themselves masters of the whole peninsula, and were then conquered by the Servians, but their short supremacy was brought to an end by the invasion of the conquering *Turks* before whom the Byzantine Empire fell in 1453, and Servia in 1459. The heavy rule of the Turks put a stop to progress, and the subject peoples sunk into ignorance and barbarity, except on the north-west coast where Dalmatia remained in the possession of Venice and later passed to Austria. Comparatively few Turks settled in the interior, but many of the natives were perverted to Mohammedanism. In the course of the nineteenth century the oppressed nationalities were roused, with Russian help, to throw off the Turkish yoke, or to acquire some measure of independence. The present political condition of the peninsula was determined by the Treaty of Berlin which followed the last Russo-Turkish War in 1878. The Balkan Peninsula was by it divided into five States. (1) The north-western part of the Dinaric Mountains, including *Dalmatia*, *Bosnia*, and *Herzogovina*, attached to Austria-Hungary. (2) The small independent principality of *Montenegro* to the south. (3) On the east the kingdom of *Servia* around the Morava valley. (4) The principality of *Bulgaria*, under the suzerainty of the Sultan, occupying the north-eastern part of the peninsula on both sides of the Balkan Mountains. (5) The *Ottoman Empire*, or Turkey, in the south.

The ethnographical boundaries do not correspond with the political. The Servians occupy the north-west, the Bulgarians the east, and Slavs of doubtful origin Macedonia. The ancient Albanian people remain by themselves in the south-west. Many Greeks live on the coast, and, with the Armenians, are settled as merchants in all the towns. Jews, descended from those who were expelled from Spain in the fifteenth century and still speaking Spanish, also occupy the towns as tradesmen and merchants. The Turks are numerous only in Constantinople; they live in small groups in Thrace, Bulgaria and Macedonia, and elsewhere as Government officials and soldiers. The Balkan Peninsula is thus the theatre of numerous races and religions, the adherents of which live in an atmosphere of fanatical hatred and political rivalry.

FIG. 166.—*The Shrinking of Turkey in Europe.*

III.—SERVIA

History.—The Servians were the first of the Balkan peoples to recover their liberty from the Turks. As early as 1817 the land on both sides of the Lower Morava was formed into a principality under Turkish suzerainty, but the Turks occupied the fortresses till 1867. Repeated wars and internal troubles, the struggle between the dynasties of Karageorgevich and Obrenovich, ending in the victory of the latter, hindered the progress of the country. The Berlin Congress at last secured complete independence to Servia, and an important increase of territory in the south, including the upper reaches of the Morava above Nish. Immediately afterwards, in 1882, it was declared a kingdom, the power of the king being limited by a popularly elected Parliament, the Skupchina.

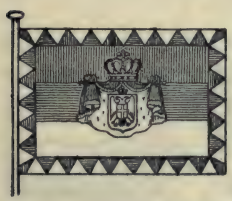

FIG. 167.—*The Servian Flag.*

Configuration.—Servia is separated on the north by the Save and Danube from Hungary and Rumania, on the west by the Drina from Bosnia, while the boundaries on the east and south are merely arbitrary lines drawn towards Bulgaria and the district still known as Turkish Old Servia, which was the nucleus of the Servian Empire in the Middle Ages. The east of Servia lies on the rugged chains of the Balkans, and is therefore very thinly inhabited, although containing copper,

lead, and iron at Maidanpek, and coal near Cuprija. The highlands of crystalline rock in the south include the Kopaonik Mountains, rising to 7,000 feet; but western Servia consists of a hilly district of younger Tertiary strata, which extends to the Hungarian Plain. The hills are covered by beautiful oak forests interspersed with fertile fields. The Morava Valley, the great artery of commerce through the peninsula, with its tributary valley of the Western Morava, forms the best part of the country. The central position of this valley, commanding the entrance to the Balkan Peninsula from central Europe, to some degree compensates Servia for being completely shut out from the sea.

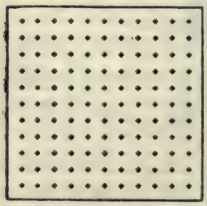

FIG. 168.—*Average population of a square mile of Servia.*

Resources and Trade.—Servia is the most fertile and densely peopled of the Balkan States, but the want of tranquility and diligence amongst the people, and the violence of party strife in politics lead to maladministration and retard the progress of the country. Only 18 per cent. of the surface is cultivated, yet the people depend almost exclusively upon agriculture and the rearing of live stock, particularly of swine in the great oak forests. The exports, principally of swine, fowls, dried plums (prunes), wheat, maize, and other farm products considerably exceed the imports of manufactured goods, and the external trade is practically with Austria-Hungary alone. Except for the undeveloped mines, there is no other industry in the country. Means of communication stand sorely in need of improvement; the roads are bad, and the railway system is confined to the lines from Belgrade to Nish, and thence to Constantinople and Salonica, with a few unimportant branches. River trade, on the other hand, is important both towards central Europe, by the Save and Danube, and towards the sea by the latter river. The education of the people, who are practically all of Servian race, and belong to the Greek Orthodox Church, still leaves much room for improvement.

Towns.—*Belgrade*, the capital, is situated in a splendid position on a hill at the confluence of the Save and Danube, not far from the mouth of the Morava, and thus it commands the great artery of traffic between central Europe and the peninsula. It was formerly of great importance as a fortress, and was the scene of many battles in the Turkish wars. It now concentrates the national life of Servia; it contains the Servian University and Government buildings, but it is by no means a handsome town. The railway junction *Nish* on the Upper Morava is the only other town that requires to be mentioned.

FIG. 169.—*Belgrade.*

STATISTICS.

	1890.	1900.
Area of Servia in square miles	18,650	18,650
Population	2,162,759	2,493,770
Density of population per square mile	116	134
Population of Belgrade	54,249	69,097
„ „ Nish	19,877	24,451

ANNUAL TRADE OF SERVIA (*in pounds sterling*).

	1871–75.	1884–88.	1891–95.
Imports	1,200,000	1,600,000	1,500,000
Exports	1,300,000	1,500,000	1,900,000

IV.—MONTENEGRO

Position and Surface.—On the stony limestone mountains which rise above the steep coast of southern Dalmatia, the Black or Barren Mountains (*Montenegro* in Italian, *Chernagora* in Slavonic), a small and very poor tribe of the Servian race has always maintained its independence against both Turks and Venetians, and through their warlike spirit and frequent raids the clansmen have made themselves feared by the surrounding people. The nucleus of the little State is an elevated, stony, limestone region, a portion of the Karst, with a raw climate and possessing only a few patches of cultivable land scattered amongst the poor pastures. The natural entrance is by the steep ascent from the deeply cut Bay of Cattaro, which, however, is in Austrian territory. In the north-east the Karst plateau is dominated by huge limestone mountains exceeding 8,000 feet in height, and cleft by profound gorges, which form the boundary towards Turkey. In the south-east a well-watered and wooded schistose range, the Brda, rises to a similar height. By the Treaty of Berlin in 1878 the fertile and warm low plain of the river Zeta and the north shore of the Lake of Scutari, into which it flows, as well as a strip of coast west of this lake containing the harbours of Antivari and Dulcigno, were added to Montenegro.

People and Trade.—On the low ground maize, fruit and wine are cultivated, but most of the Montenegrins, a tall, powerful and honest mountain people, make their living by cattle-rearing. The very small export trade is almost entirely with Austria-Hungary, and consists of products of the pastures. Many Montenegrins emigrate as workmen to other countries. The State, like the people, is very poor, and can only exist through the help of Russia. There is absolutely no industry, and in spite of all attempts at improvement, roads, commerce, and education are in a very backward state ; there are no railways at all. The hereditary Prince is an absolute monarch ; every man serves in the army in time of war, and almost all belong to the Greek Orthodox Church.

The area of Montenegro is only 3,500 square miles, and the population about a quarter of a million. The capital, *Celinje* (Cettigne), situated on the plateau not far from the Bay of Cattaro, and the larger town *Podgoritza*, on the Zeta, are little more than villages.

V.—BULGARIA

History and Constitution.—The national life of Bulgaria recovered later than that of Servia. It was only in the second half of the nineteenth century that the Bulgarians began to try to escape from Turkish tutelage and from the influence and guidance of the Greek nation, and to found a national church, schools and literature. The Russo-Turkish War secured to the principality of Bulgaria an autonomous government under Turkish suzerainty, and the Treaty of Berlin in 1878 defined it as the land between the Danube and the Balkans, together with the Sofia plain and its surrounding mountains. The autonomous province of Turkey, Eastern Rumelia, formed at the same time, has been treated as an integral part of Bulgaria since 1885. The whole country is governed constitutionally, the Sobranye, or parliament, being elected by the people.

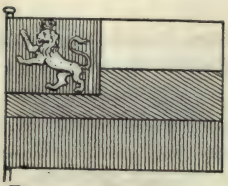

FIG. 170.—*The Bulgarian Flag.*

Surface.—The form of the country is that of a rectangle directed from west to east, from Servia to the Black Sea. The Danube divides it on the north from Rumania, except the Dobruja. On the south the frontier follows the hills which separate the plains of Eastern Rumelia and Adrianople, and zigzags across the northern Rhodope. The chain of the Balkans divides Bulgaria into two large parts—the Danubian-Bulgarian plateau in the north, with an extreme and dry climate but good soil for grain-growing, and the hill-girdled basins in the south. To the west a group of high valley basins with a raw climate surround the central Sofia basin. The eastern group of basins south of the Balkans, especially the Eastern Rumelian Plain, through which the Maritza flows, is warm, well-watered, and fertile, forming the best part of the country. The Rilodagh and other mountains south of the fertile zone are wild and thinly peopled.

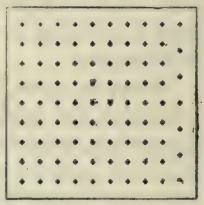

FIG. 171.—*Average population of a square mile of Bulgaria.*

People and Trade.—Bulgaria is the strongest and most settled of the Balkan States, in spite of some troubles resulting from past centuries of misgovernment. A keen desire exists amongst the people to annex the neighbouring part of European Turkey inhabited by Slavs, especially Macedonia; hence the national interests conflict with those of Servia, Greece and Austria, and necessitate the maintenance of a large standing army. Three-quarters of the population are Bulgarians belonging to the Greek Orthodox Church, which is established under a separate Exarch. About half a million Turks still remain in the east of the country, but the number is being reduced by emigration, and the Greek element is con-

siderable in the coast towns. The population is not yet nearly so dense as the fertility of the land can support, and consequently the peasants are in easy circumstances; yet they are steadily improving their methods of agriculture. Maize and wheat are grown in Danubian Bulgaria; in Eastern Rumelia rice, cotton, wine, and fruit, particularly plums, are also cultivated. Silk-growing is a feature of this district, and the cultivation of roses is carried on to a very large extent for the extraction of the typical Oriental perfume, attar of roses. Sheep, goats, many cattle and buffaloes are kept. The woods on the mountains yield excellent timber; and the water-power is utilised for industrial purposes, particularly wool-weaving and small ironworks. The mineral resources are insignificant. External commerce is more developed than in Servia, the exports consisting chiefly of grain, particularly wheat, pastoral products, and attar of roses; it is carried on principally with Turkey, the United Kingdom, Germany and France. The imports are principally manufactured goods from Austria-Hungary, the United Kingdom, Turkey, and Germany. The Danube and the fairly good harbours of Varna to the north and Burgas to the south of the Balkans facilitate external trade. Numerous roads traverse the country in all directions. A railway connects Rushchuk on the Danube with Varna, and a branch from the great Orient railway, which traverses the Diagonal Furrow, reaches Burgas. A line in course of construction from Sofia through the Isker valley will be the first railway to cross the Balkans.

Towns.—The capital, *Sofia*, is situated in the basin between the Vitosh Mountains and the Balkans, at an important meeting-place of roads. It is very ancient, but has only begun to flourish since the independence of the country; it has been completely rebuilt after the style of a Russian town. *Philippopolis* is picturesquely built on an isolated basaltic height overlooking the Maritza in the middle of the Eastern Rumelian Plain. A series of fortified towns along the high bank of the Danube command the ferries. *Rushchuk* is the most important, but *Vidin* and *Silistria* have played a great part in military history. *Plevna* in the east of the Bulgarian plateau was, from its commanding position, the scene of the decisive battle in the last Russo-Turkish War.

STATISTICS.

	1893.	1900.
Area of Bulgaria (square miles)	37,282	37,282
Population of Bulgaria	3,309,816	3,733,189
Density of population per square mile	89	100
Population of Sofia	47,000	67,920
„ Philippopolis	36,000	42,849
„ Varna	28,000	33 443
„ Rushchuk	28,000	32,661

ANNUAL TRADE (*in pounds sterling*).

	1880–84.[2]	1891–95.
Imports	1,900,000	3,300,000
Exports	1,600,000	3,100,000

[1] It is to be noted that in commercial reports, throughout the East generally, Austria-Hungary is credited with a considerable amount of export trade which really consists of German goods sent by rail into the Balkan Peninsula (or by Triest).

[2] Before the annexation of Eastern Rumelia.

VI.—EUROPEAN TURKEY

Position and Surface.—The centre of gravity of the Ottoman Empire now lies entirely in Asia, only the crumbling ruins of former great possessions remain in Europe. It includes the greater part of Asia Minor, Syria, Mesopotamia, parts of Arabia, and exercises suzerain rights over Tripoli and nominally over Egypt and Cyprus. European Turkey now (Fig. 166) occupies a narrow strip of the Balkan Peninsula between Bulgaria and the Ægean Sea, the southern part of ancient Thrace, and in the west a triangular area including Macedonia, Old Servia, and Albania, reaching to the Adriatic and bordered by Servia, Bosnia, and Montenegro in the north, and by Greece in the south. The western portion of Turkey is so shut in by the Rhodope Mountains from eastern Thrace that the two are only put in communication by the plain along the coast. The provinces have no common interests, they are peopled by a mixture of races, amongst which the Turks are in a minority, and they are only held together by the force of arms and the jealousy of the Great Powers. While the possession of the straits and the proximity of Asia Minor dominate the eastern part, and have led to it becoming the centre of both the Byzantine and the Ottoman Empires, the Vardar valley in western Turkey supplies the line of communication between central Europe and the Ægean Sea. The possession of the straits as an outlet for its Black Sea fleet is a great desideratum for Russia, and the control of the Vardar valley is of equal importance to Austria. The Greeks look upon Epirus and western Macedonia as belonging by right to Greece; in Albania, Austrian and Italian interests oppose each other, and are met by the ambition of the inhabitants for an independent Albania.

People, Government and Trade.—In spite of many reforms in details the methods of Turkish government still remain essentially Oriental, and foreign to modern principles. The Sultan is absolute master of the land and the people, his ministers and officials being responsible to him alone. Only Mohammedans possess civil rights, small as these are in such a State, and they have to bear the whole heavy burden of military service. The Christian population is practically without rights. The Turkish administration shows by the arbitrary conduct, the acceptance of bribes, and the entire want of method on the part of the frequently changed officials, that it has never understood, and still does not understand, how to utilise or develop the rich resources of the country. The population lives almost exclusively by agriculture and cattle-rearing, very carelessly carried out and leaving much of the land unutilised. Almost all the land belongs to the crown, the church, or to large proprietors; the peasants live in the deepest poverty and ignorance, oppressed by heavy taxation. The chief

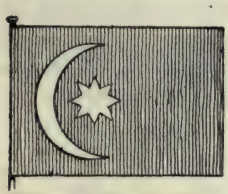

FIG. 172.—*Turkish Naval Ensign.*

productions are grain, maize, flax, hemp, cotton, tobacco, silk, wine, and, on the coast, olives. Oxen and buffaloes are used as beasts of burden and for farm-work. The forests have been nearly destroyed, and are very badly managed. There is practically no industry except hand-loom weaving and artisan's work. Most of the trade in the towns, and almost all the shipping are in the hands of Greeks and Armenians, or of foreigners who enjoy the great privileges of freedom from taxation, and the protection of their consular courts. The roads are so bad and so little developed that large districts are unable to place their products on the market. Yet there are now a few important railways, including the lines from Belgrade by Sofia to Constantinople and to Salonica, and the line along the coast from Constantinople to Salonica and Monastir, and that from Uskub to Mitrevitza. The postal and telegraph systems are undeveloped and so unsatisfactory that the Great Powers have their own post-offices in the large towns. In spite of the exceptionally favourable geographical position of European Turkey, political conditions have prevented any developments of transit trade or shipping. The chief exports are grain, beans, fruit, honey, wax, wine, tobacco, wool, attar of roses, also carpets, arms, and leather goods. The chief imports are textiles, colonial wares, wool and coal, rice, petroleum and iron. The United Kingdom, France, Austria-Hungary, and indirectly Germany, have the chief trade with Turkey.

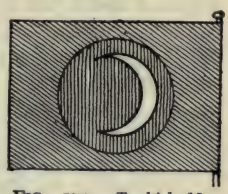

FIG. 173.—*Turkish Merchant Flag.*

The population consists in nearly equal parts of Turks, Greeks, Albanians, and Slavs (Bulgarians and Servians), and also a certain number of Rumanians, Jews, Cherkesses, Armenians, and Gypsies. About half the population are Mohammedans, including the Turks and Cherkesses, most of the Albanians and some Bulgarians. The rest are principally Greek Catholics, and were formerly under the Greek Patriarch at Constantinople, but now most of the nationalities have a separate form of Church government. None of the Turkish statistics can be viewed as trustworthy, and all figures must be looked upon as mere estimates. The country is divided into a number of *vilayets* or provinces, the boundaries of which are arbitrarily drawn and frequently changed.

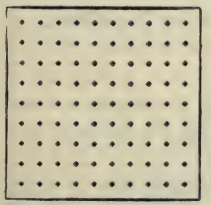

FIG. 174.—*Average population of a square mile of European Turkey.*

The Bosporus.—The Bosporus forms the focus of the shipping routes between the Black Sea and the Mediterranean, and of the land routes between Europe and Asia Minor. It is a winding, river-like valley with picturesque slopes leading up on both sides to a level-topped plateau of schistose rocks. A strong current flows through it from the Black Sea to the Mediterranean, and the depth is more than sufficient for the largest ships. The beautifully

wooded and cultivaed banks are lined witth towns and villages, castles and parks, ancient towers and modern forts which can stop the passage of a hostile fleet. In contrast to the rich fertility of the banks the plateau is bare and desolate. The southern end of the Bosporus is the great centre of population, and here the world-famous city of *Constantinople* surrounds the narrow curved inlet of the Golden Horn which forms a magnificent harbour on the European side, and the coast of the Sea of Marmora bounds a triangular hilly peninsula on which the Greek colony of Byzantium was founded about 700 B.C. The Roman Emperor Constantine, changing its name to Constantinople, made it the capital of the Roman Empire ; and as the metropolis of the Eastern Empire it became in the Middle Ages the most splendid and richest town in the world, the great meeting-place of East and West. The glory of those days is still recalled by the incomparable church of St. Sofia, now a mosque, the great city walls and other buildings. When the Turks conquered it in 1453, "Stambul" lost much of its commercial value, but it has always continued to be the centre of the Islamic as well as of the Greek Orient. Its beautiful mosques with their minarets commanding magical views of the city, the bazárs, the public wells, the multifarious street life, give to the town even yet a purely Oriental aspect. Here the Turkish element preponderates as the Greek does in the adjoining suburb of *Phanar*. On the contrary the suburbs of *Pera* and *Galata* on the northern side of the Golden Horn are quite European in appearance, and form the modern commercial city. *Scutari* on the opposite side of the Bosporus is entirely Turkish. Altogether these towns contain about a million inhabitants, half of them Mohammedans, the other half almost equally divided between Armenians, Greeks and foreigners, most of whom are Greek subjects ; about 5 per cent. of the population are Jews. On the wider and less picturesque strait of the Dardenelles, also protected by numerous forts, stands the harbour of *Gallipoli*.

FIG. 175.—*The Bosporus.*

Eastern Turkey.—Compared with the neighbourhood of the straits, the whole of Eastern Turkey, the vilayets of Constantinople and Adrianople, are thinly peopled, except on the notable Maritza river which flows through a very fertile vallev. Where it enters the hill-girdled plain, and is rendered navigable by the junction of important tributaries, at the intersection of the Diagonal Furrow with the roads from the Balkan

Passes, the town of *Adrianople*, the most important military post of European Turkey, has its site. *Dede Agach* is the harbour of the Maritza region, exporting grain on the Ægean Sea. From this point the railway to Salonica passes along the low coastland which, like the off-lying islands, is mainly inhabited by Greeks. The Rhodope Mountains in the north are inhabited by wild Pomaks or Mohammedan Bulgarians. The island of Thasos, although the nearest to Europe, is politically part of Egypt, while Samothrace, Imbros, Lemnos, and Strati, belong to Asia.

Macedonia.—Macedonia, including the vilayet of Salonica and part of Monastir, is the best part of European Turkey. It contains many fertile hill-girdled plains; and in the south-east gold and silver were formerly mined, but the mineral resources are not yet properly utilised. The principal products are grain, tobacco, and, on the coast, olives. On the coast and in the south-west the people are Greeks; elsewhere the Slavs predominate, with a sprinkling of Greeks, Turks, Rumanians and Jews, and the strife of races is very acute. The important seaport of *Salonica*, inhabited mainly by Spanish Jews, stands at the outlet of the great Vardar valley. The other towns of importance are *Seres*, in the east, and *Bitolia*, in the fertile high basin of Monastir in the west.

Old Servia, or the vilayet Korsovo, between Macedonia, Albania, Montenegro, Bosnia, Servia and Bulgaria, on the upper tributaries of the Vardar, Morava, Drina, and Drin, contains an alternation of fertile hill-girdled valleys and high mountains. In this district Albanians, Servians and Bulgarians struggle and intrigue for supremacy, and on account of its commanding geographical position it is of exceptional political importance. The north-western part forming the Sanjak (district) of Novi-Bazar, between Servia and Montenegro, is in the military occupation of Austria-Hungary. The chief towns are *Prisrend*, at the northern base of the Shardagh and *Uskub* on the upper Vardar, where the roads from Servia, Bosnia, and Montenegro to Salonica converge.

Albania.—Albania, comprising the vilayets of Scutari, Janina, and part of Monastir, is a wild and inaccessible mountain-land descending on the west to a swampy and unhealthy coastal plain. Epirus, which belongs physically to the Greek Peninsula, and is inhabited almost exclusively by Greeks, is included in Albania, and has quite a similar character. The Albanians are a warlike and very uncultivated people, whose speech has never up to modern times become a literary language; they are divided into several tribes at enmity with each other, and many fall victims to family feuds and private vengeance. The authority of the Turkish jurisdiction is confined to the larger towns. The people are in almost equal parts Mohammedans, Greek and Roman Catholics—a fact which places a very serious obstacle in the way of independence for Albania. The resources of the land are small, consisting of cattle-breeding in the interior, and olive culture in the coast. The principal towns are *Scutari* in the north on the Drin, not far

from the coast and close to Lake Scutari, and *Janina* in the interior. In ancient times the harbour of Dyrrhachion (Durazzo) and Apollonia (Valona) carried on a great trade with Italy, but there are no Albanian harbours of modern importance.

STATISTICS (*estimates*).

Area of European Turkey in square miles	65,598
Population	5,864,000
Density of population per square mile	89

POPULATION OF CHIEF TOWNS.

Constantinople (with suburbs, 1885)	874,000	Gallipoli	30,000
Salonica	150,000	Janina	30,000
Adrianople	71,000	Seres	25,000
Monastir	50,000	Skutari	20,000
Prisrend	40,000	Uskub	20,000

THE OTTOMAN EMPIRE (*estimates*).

	Area in square miles.	Population.
Turkey in Europe	65,600	5,864,000
Anatolia (Asia Minor)	200,000	9,000,000
Armenia and Kurdistan	89,200	2,457,000
Mesopotamia	100,200	1,350,000
Syria	115,100	2,677,000
Arabia	173,700	6,000,000
Tripoli	398,700	1,300,000
Ottoman Empire	1,142,500	28,648,000

Bulgaria, Bosnia and Herzegovina, Samos and Egypt are also considered to form part of the Sultan's dominions.

VII.—GREECE

Position and Boundaries.—The Greek Peninsula stretches southward from the south-west corner of the Balkan Peninsula between the Ægean and the Ionian Seas. The coast, which is almost everywhere mountainous, is deeply indented by great gulfs and by innumerable small bays which form a great number of excellent harbours. The country is divided by gulfs on opposite coasts into three parts, Northern Greece, Central Greece and the Peleponnesus; the last named is connected only by the low and narrow Isthmus of Corinth, across which the Gulfs of Corinth and Ægina are now united by a ship canal. Numerous islands diversify the Ægean Sea; the sailor in passing from Greece to Asia Minor has always land in sight. The Ionian Islands lie along the west coast. While the barren mountains of the Balkan Peninsula effectually shut off Greece from overland trade, its position is exceptionally favourable for traffic by sea.

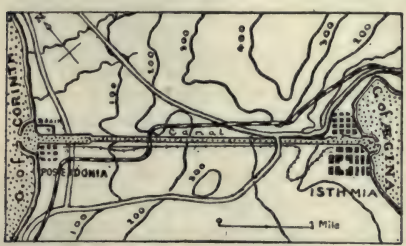

FIG. 176.—*The Isthmus of Corinth Ship Canal.*

Surface.—The Greek Peninsula is filled with the continuation of the

mountain systems of the Balkan Peninsula (see Fig. 165). The folds of the Dinaric Mountains, with their long, parallel limestone ridges, separated by troughs of sandstone and schists, run through the west of the region, and are closely bordered by the wild Pindus range, which divides Greece as far as the Gulf of Corinth into definite eastern and western parts. The Dinaric mountain system also occupies the Ionian Islands and the greater part of the Peleponnesus, where Mount Taygetos reaches the height of 7,890 feet, and finally it turns and runs in a curve of islands towards Asia Minor, shutting in the Ægean Sea on the south. The north-east of Greece is traversed by the continuation of the crystalline rocks of Thrace and Macedonia, which build the mountains of Thessaly, including the fabled mount of the gods, Olympus (9,800 feet). The east of Central Greece, Eubœa, and north-eastern Peleponnesus are, on the contrary, mainly occupied by mountain chains of Mesozoic limestone stretching in curves from west to east; the best-known summit of these mountains is Parnassus, rising in the very heart of Greece to the height of 8,060 feet. The Cyclades stretching to the east of the Peleponnesus are occupied by less abrupt and lower mountains of crystalline formation.

The steep and rugged highlands of Greece are cleft by many irregular depressions or rifts, the floors of which are sometimes occupied by the sea, sometimes by fertile plains or hilly ground. Strong earthquake shocks which originate in them often cause great destruction. Many of these basins are drained by subterranean channels in the limestone; these sometimes get blocked and lead to the formation of lakes, which frequently disappear again after some years, but are often permanent. Although the little mountain-girdled plains take up but a small part of the area of the country, they have in all ages been the centres of culture. In this small region the sharpest physical contrasts are crowded together; wild mountains and sterile limestone plateaux rise close to fertile plains and tranquil inlets of the sea. While this arrangement gives much variety and beauty to the landscape and is favourable for seafaring and to some extent for mining, it leads, on the other hand, to a low general average of productiveness and to the subdivision of the country into a number of separate provinces.

Climate and Vegetation.—On the low grounds Greece enjoys the typical Mediterranean climate, hot and almost rainless summers with warm and rainy winters, although frost and snow are not entirely unknown. The rainfall is considerable in the west but small in the east, where the drought is often excessive; there are few permanent streams, and in summer all grass and vegetation on the plains wither. Artificial irrigation is consequently necessary for successful fruit-growing. In the mountains rain falls in summer and much snow in winter. The vegetation of the plains consists principally of evergreen shrubs and occasional fir and oak woods. In the mountains there are some fine forests of conifers and oak, but at great heights the vegetation assumes an Alpine character.

History and People.—From the dawn of authentic history Greece has been inhabited by the *Hellenic* people (*Græci*, Greeks) a branch of the Aryan family. The intellectual supremacy of Greece in antiquity was the foundation of modern civilisation, and, from the material point of view, was not due only to the careful utilisation of the manifold though not rich resources of the country by a highly gifted people, but also to the fine situation of Greece for the trade of the early world between the ancient civilised countries of Asia and the newly opened lands of the western Mediterranean. Side by side with the commercial, there was a great industrial development, and Greek merchants and sailors spread the culture of their people by founding colonies in every part of the then known world. During the last centuries of antiquity Greece lost its importance more and more on account of changes in trade routes; while political subdivision and the small fertility of the land led to its gradual impoverishment and depopulation. In consequence of the destruction of woods and allowing the land to lie fallow, much of the soil was washed away by the heavy rains of winter and the old harvest-fields became useless. The inroads of barbaric tribes, the endless wars of the Middle Ages, and lastly the tyranny of the Turks completed the ruin of the land. Yet Greece all along retained a certain importance in the trade of the Levant, and Venice held some of the best of the Greek islands and harbours on the coast for centuries against the Turks. In the course of the Middle Ages many Slavs and Albanians settled in the mainland, and many Italians on the islands; but all of these gradually became assimilated with the original Greeks in speech and habit, until now only a few of the Albanians speak their original language.

The reawakening of the Hellenes began late in the eighteenth century, and culminated in the spirited war of independence from 1821 till 1829. The result was the creation of the kingdom of Greece which contained only the Peleponnesus, Central Greece, Eubœa and the Cyclades. In 1864 the Ionian Islands were ceded to Greece by the United Kingdom, and the Treaty of Berlin in 1878 extended its territory to the north so as to include the greater part of Thessaly. The northern boundary of Greece is now a line starting from the Gulf of Arta in the west, following the Arta river northwards, then crossing the Pindus and the low ranges of Thessaly to the southern base of Olympus; it does not coincide with the natural frontier, which should run from Cape Akrokeranian to Olympus and include the whole of Thessaly and Epirus. Crete and other neighbouring islands belonging geographically and ethnographically to Greece are also outside its limits. The Greek people indeed are scattered over all the islands and the coast of the Balkan Peninsula and Asia Minor.

Government.—The population is almost entirely Greek; it includes only about a quarter of a million Albanians in the east of Central Greece and the north-east of the Peleponnesus, and a few Rumanians in northern Greece The Greek Orthodox Church includes almost the whole

people; it is an independent national church under a Metropolitan in Athens. Education is well cared for, and the number of illiterates is smaller than in any other part of eastern or southern Europe. The government is that of a very free constitutional monarchy, the parliament being chosen directly by the people. Party strife, frequent changes of ministry and officials, do serious harm; yet, in spite of the great weakness of the government, the country has made immense progress since its independence, and the Greeks are the best-educated people and the highest in culture in the Balkan States.

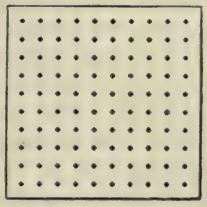

FIG. 177.—*Average population of a square mile of Greece.*

Resources and Trade.—Agriculture is the principal resource of the country, although the amount of cultivable land is small (only about 18 per cent.), the warm plains are of extraordinary fertility. The condition of the peasants is very good, except in Thessaly where large estates are the rule. Grain and maize are not produced in sufficient quantity to meet the home demand, but wine, olives, tobacco and fruit give an abundance for export, and some cotton and silk are also produced. The fruit most important in trade is the currant (the name is a corruption of *Corinth*) which is produced only in Greece and mainly in the west. The rearing of live stock, principally sheep and goats, the wasted forests and the fisheries do not yield enough for home needs. The only important products of the sea are bath sponges. Laurion, in Eastern Attica, is an important mining district; emery is obtained in the island of Naxos, and inferior lignite occurs in Greece. No great industrial development is possible on account of the want of coal, water-power and capital.

The merchant fleet is important and carries on a great part of the trade in the eastern Mediterranean; and the foreign trade of Greece itself is considerable. One-half of the value of the exports consists of currants, then follow lead and zinc ores, wine, oil, tobacco, figs, sponges and valonia (acorns). The exports go principally to the United Kingdom, France, Austria-Hungary and the United States; the imports, consisting mainly of grain, manufactures of all kinds, wood and fish, come chiefly from the United Kingdom, Russia, Turkey and Austria-Hungary. Traffic is mainly by sea along the coast; the roads, formerly for the most part mere mule-tracks, are being improved; and railways are also being developed. The only lines of importance are one from Athens across the Isthmus of Corinth to the Peleponnesus, where it branches to the west along the coast to Patras, and to the south. There are two lines in Thessaly, and a few local railways. Post and telegraphic communication are, however, well provided for.

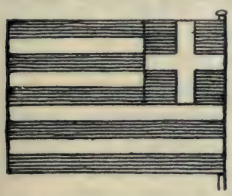

FIG. 178.—*The Greek Merchant Flag.*

Northern Greece.—Northern Greece includes the wild mountain district of the Pindus, except Turkish Epirus, inhabited by poor and sometimes predatory herdsmen, and Thessaly to the east, the mountains of which surround the largest and most fertile plains of Greece. The land is comparatively ill-cultivated and thinly peopled, as it was only recently freed from Turkey. Still, since that time the province has made surprising strides as the flourishing condition of its towns, *Trikkala* in the interior and *Volo* on the coast demonstrated before the last war, in 1896, had again thrown the province back.

Central Greece.—Central Greece, although mainly mountainous in the west, contains some fertile plains where currant-growing is carried on in Ætolia. The chief harbour of the district is *Missolonghi*, lying on a great lagoon, and renowned for its heroic defence during the war of independence, and for the death of Lord Byron whose verse celebrated the revival of Greek nationality. On the east there are some rich inland plains, particularly in Bœotia, one of which contained the recently drained lake Kopais.

FIG. 179.—*Athens and the Piræus.*

Cotton is largely cultivated in this district. *Thebes*, the old capital of Bœotia, is now merely a village. The large mountainous island of Eubœa is celebrated for its wine-growing, and is separated from the mainland by the very narrow Strait of Euripus. The south-eastern extremity of Central Greece, which projects as a peninsula, only shelters small stony plains between its mountains, which are low and barren, although rich in marble and ores. Six miles from the sea, in one of the little plains opening southward on the beautiful island-studded Gulf of Ægina stands *Athens*, the city which in ancient times embodied the highest development of Greek culture. Its material prosperity depended upon its position in the centre of the Greek world on the most important trade route which traversed the Gulfs of Ægina and Corinth uniting the trade of the Ægean with that of the West. After a long period of obscurity Athens is now once more the centre of the whole Greek nation. The brilliant and beautiful city is entirely modern, but built round the steep, rocky hill of the Acropolis with its splendid world-renowned ruins. Museums, educational establishments, including a university and a polytechnic, and other fine public buildings adorn the capital, while trade and industry have their seat around the excellent natural harbour of the Piræus which now forms a suburb of Athens.

Peleponnesus.—The Peleponnesus, approached from Central Greece

by the Isthmus of Corinth, contains in the luxuriant plains of the north and west coasts the richest part of Greece; the districts of Achaia, Elis and Messenia producing the greatest crops of currants, which are exported mainly from the harbour of *Patras* in the north-west. The plains of Laconia (Sparta) in the south-east of Argos, and Corinth in the north-east were important centres of ancient culture; but the towns now known by these names are of small importance. The highland district of Arcadia in the interior also contains some fertile land.

The Greek Islands.—The *Ionian Islands*, Corfu, Leukas, Cephalonia, Ithaca, Zante and Cythera are all mountainous in the middle, but round the heights there are zones of hilly land and plains of extraordinary productivity in currants, wine and fruit. A large part of the Greek merchant shipping belongs to these islands. The good government which they long enjoyed under the Venetian Republic and the United Kingdom leaves its mark in their well-ordered affairs. The town of *Corfu*, with its splendid harbour, is specially engaged in the trade with Italy and Austria.

The Greek Islands in the Ægean Sea are on the whole of small fertility, yet the *Cyclades*, particularly Naxos and Santorin, produce excellent wine and fruits. Santorin is a ruined volcano, the great crater of which has been invaded by the sea, and in the centre of it repeated eruptions, the latest in 1866, have formed several new small volcanic islands. Little Syra, in the centre of the Cyclades, contains the town of *Syra*, also called *Hermoupolis*, which has risen during the nineteenth century into the most important trading centre of the whole Ægean; but it is now declining. Several small islands on the east coast of the Peleponnesus, Hydra, Spetsae and Paros are inhabited by Albanians and carry on considerable shipping trade.

FIG. 180.—*Santorin.* (*Sea less than 100 fathoms is shown white.*)

STATISTICS.

	1889.	1896.
Area of Greece (square miles)	25,152	25,152
Population of Greece	2,187,208	2,433,806
Density of population (per square mile)	87	96
Population of Athens	107,251	111,486
" " (with Piræus and suburbs)	148,924	179,755
" Piræus	34,327	43,001
" Patras	33,529	37,985
" Trikkala	14,820	21,149
" Syra	22,104	18,760
" Corfu	19,025	18,581
" Volo	11,029	16,788

ANNUAL TRADE OF GREECE (*in dollars*).

	1871–75.	1879–83.	1891–95.
Imports	20,000,000	24,500,000	22,500,000
Exports	15,500,000	13,500,000	17,000,000

VIII.—CRETE

Crete.—The Island of Crete (modern Greek *Kriti*, Italian *Candia*) forms part of the great curve of islands which bounds the Ægean Sea on the south. Three mountain masses, principally composed of limestone, occupy the island ; the chief being Mount Ida, 8,070 feet high. The mountains fall steeply on the south to a harbourless coast, in the middle of which the only low ground occurs as the plain of Mesara. To the north they fall more gently, forming a hilly region of considerable fertility and ending in a richly indented coast. The climate is warm and the rainfall sufficient. Extensive herds are pastured on the mountains, and the plains yield grain, oil, wine and fruit plentifully. Crete has acquired particular importance on account of its position at the exit of the Ægean Sea, which made it in ancient times a great sea power, with numerous thriving towns. In the Middle Ages it was for some time in the possession of the Arabs ; it declined gradually in importance under the Venetians, and its ruin was completed by the dominion of the Turks from 1669 to 1898. The island has now received autonomous government, guaranteed by the Great Powers, but it remains under Turkish suzerainty. A part of the population having become perverted to Mohammedanism, bitter religious feuds have led to continuous strife and bloodshed, in which the brave mountain tribe of the Sphakiotes took a conspicuous part. In spite of religious differences almost all the people belong to the same Greek stock, even the Mohammedans speaking no language but Greek. Before the revolution of 1896 about one-quarter of the population were Mohammedans, but now most of them have left the island. The people live almost exclusively by agriculture and cattle-breeding ; the principal products being wine, olive oil and carobs. The three towns of the island all lie on the north coast, and possess indifferent harbours ; *Khania* (*Canea*) in the west, *Rethymnon* further east, and the largest town, *Iraklion* (*Megalokastrom* or *Candia*), about the middle of the coast-line. Suda Bay, with the best anchorage for shipping, lies a little to the east of Canea.

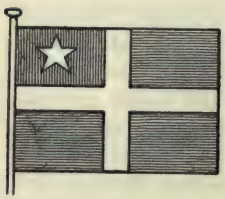

FIG. 181.—*The Cretan Flag of* 1898.

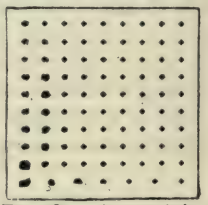

FIG. 182.—*Average population of a square mile of Crete.*

STATISTICS.

	1900.
Area of Crete in square miles	3,324
Population of Crete (estimated)	303,543
Density of population per square mile	91
Population of Candia	22,331
„ Canea	21,025
„ Rhetymnon..	9,311

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CHAPTER XX.—ITALY AND MALTA

I.—ITALY

By Dr. Theobald Fischer,[1]
Professor of Geography in the University of Marburg.

Position and Geological History.—The Italian Peninsula, central amongst the peninsulas of southern Europe, owes its origin and configuration to the circumstance that a branch of the great Eurasian Earth-fold on the eastern edge of the old Tyrrhenian crust-block diverges in a southerly direction across the Mediterranean belt of subsidence, and only resumes the east and west direction of the Eurasian folds in the south in the present Sicily. This accounts for the configuration of Italy and its extent through 11° of latitude from 47° to 36° N. as a long, narrow land bridge across the Mediterranean Sea. The Appennines are perhaps the most recently formed mountains in Europe. The plain of Lombardy in the north took its rise from the elevation in Quaternary times of a deep gulf of the Adriatic Sea between the Alps and Appennines, combined with the accumulation of the sediment brought down from both ranges by glaciers and rivers. The Quaternary uplift also brought together the severed portions of an older pre-Miocene Appennine range which had not been incorporated by the last folding movement; thus Gargano and the Apulian Cretaceous plateau in the south-west were united with the Appennines. A portion of the Appennine land

Fig. 183.—*Tectonic Map of Italy.*

[1] Translated from the German by the Editor

separated in the Pliocene epoch by a rift, being cut off at the same time by a similar dislocation from the continuation of the Appennines in Tunisia, forms the present island of Sicily. The Malta group, Lampedusa, and the Ægadian Islands at the west end of Sicily are all that remain of the great Tertiary plateau which once united Sicily with Tunisia. Only fragments are left of the ancient mass of Tyrrhenia which lay to the west of the present Appennine lands, and in the course of the Tertiary and Quaternary periods gave rise by direct subsidence to the vast depression now occupied by the Tyrrhenian Sea. Some of these relics were attached to the Appennine lands by the latest crustal movements and form the plateau of Tuscany, Calabria and the north-east of Sicily, while the twin islands Sardinia and Corsica represent a portion left standing in the middle of the depression.

Natural Divisions and Coasts.—Italy consists of three parts: the *Continental*—including the slopes of the Alps and Appennines towards the northern plain—the *Peninsular*, and the *Insular*. The two latter form more than two-thirds of the whole, and even in continental Italy the distance from the coast is so small that 80 per cent. of the whole country is within 62 miles of the sea; Turin is 65 miles and Milan only 75 miles from the coast. Italy is separated from central Europe by the great wall of the Alps, and it is as a whole a maritime Mediterranean country. The detailed structure of the coast emphasises this character by its remarkable richness in natural harbours, particularly on the west, where the bays of Genoa, Spezia, Talamone, Gaeta, Naples, Salerno, Policastro, Santa Eufemia, Palermo, and Castellamare succeed one another. The numerous islands off the coast include Elba, a remnant of the ancient Tyrrhenia, and the volcanic groups of Ponza, Ischia, and the Lipari Islands, which beautify the surface of a sea rich in fisheries and precious coral. While the land frontier of Italy measures only 1,200 miles, the coast stretches for more than 4,000. Except on the shallow shores at the head of the Adriatic, the coast is everywhere easily accessible from the interior, and is as a rule bold and rocky with picturesque promontories furnishing magnificent landmarks and offering fine sites for lighthouses visible far to seaward. On the west coast only the northern part from Spezia to the Gulf of Gaeta is flat and swampy, making artificial harbours necessary at Civita Vecchia and Leghorn. The population of Italy is generally dense along the coast, and more than 16 per cent. of the present population live within three miles of the sea.

Value of the Position and Resources of Italy.—Italy, as a whole, looks towards the west, and in a sense towards the east also, although, so to speak, the peninsula turns its back upon the Adriatic, which is only 110 miles wide on the average, and at the Strait of Otranto less than fifty. The country is singularly well placed for communication with the eastern Mediterranean and the Suez Canal on account of its fine eastward-facing harbours of Venice, Brindisi Taranto, Messina, and Syracuse. From Sicily and Sardinia com-

munication with the north coast of Africa is easy, the distance from Sicily being less than 100 miles. With continental Europe there is land communication by the Alpine roads which converge on Turin, Milan, and Venice. These many-sided relations make the geographical position of Italy exceptionally favourable for commerce, and on this account it became the focus of the trade and civilisation of the narrow world of antiquity and the Middle Ages. It is to-day the very heart of the Mediterranean lands and plays a great part as a link in the chain of communication between north-western Europe and the Far East. Italy may become one of the real Great Powers only if it succeeds in commanding the Mediterranean by its naval forces. The Italian people are directed to the sea as their field of enterprise the more distinctly because three-quarters of the surface of the land is built up of geological formations not older than the Tertiary period, and consequently there is little mineral wealth. No coal is found, and the sulphur deposits which occur mainly in Sicily are the most valuable mineral resources; they supplied till a short time ago most of the sulphur used throughout the world. The marble quarries of Massa, Carrara, and Serravezza are of great value. Iron-mining is only important in the relics of the ancient Tyrrhenia in Elba and Sardinia. The industrial value of the country is due to the production of a few important raw materials—silk, flax, hemp, and straw—to the economy of sea-transport, the cheapness of labour in a country with so rich a soil and so genial a climate, and at the present day to the utilisation through electricity of the important water power made available in the Alps and Appennines.

Configuration of the Alps.—Since Italy is mainly composed of the Appennine range with which the inner slopes of the Alps unite, it is on the whole a mountainous land. Only one-third of the surface is made up of plains, most of this being the great Plain of Lombardy. The Italian Alps (Fig. 51), usually named after the provinces of the neighbouring plain, *e.g.*, the Alps of Piedmont, Lombardy, and Venetia, tower into lofty summits and abound in snow-fields and glaciers. Mont Blanc and Monte Rosa rise on the boundary line. The Alpine chain is trenched by numerous transverse valleys running parallel to one another, formed by the erosion of the Po and its tributaries the Dora Baltea, Sesia, Ticino, Adda, and further east the Adige and Tagliamento, by which roads are carried through the bordering mountains up to the important passes across the Alps—the Mt. Cenis, Simplon, St. Gothard, Splügen, Maloja and Brenner. Where the valleys meet the plains they are often occupied by long, narrow lakes along which the Alpine roads run through scenes of famous beauty. The upper Italian lakes, especially Lago Maggiore, Lago di Como and Lago di Garda are not only important as pleasure resorts but they form the great reservoirs for the rivers of the plain.

Configuration of the Plain.—The Plain of Lombardy is a long, narrow trough formed by subsidence between the Alps and Appennines,

which inclines eastward towards the Adriatic as well as inwards towards the central line along which the river Po flows. In the middle of the plain beautiful groups of small hills arise, especially the Monti Berici near Vicenza and the Colli Euganei near Padua, both of which are remains of old volcanic activity, on the inner side of the great crack between the Alps and the plain. The Montferrato hills between Turin and Alessandria in which La Superga rises to 2,140 feet, commanding a splendid view across the plain, are orographically separated from the Appennines by the broad valley of the Tanaro, which occupies a synclinal fold of the Appennine system. These hills give a special character to the Piedmont portion of the plain. A hilly region, for the most part made up of old moraine amphitheatres set with small lakes and moors, the peat of which is already in most cases exhausted, runs close along the base of the Alps, the perfect form of the plain first appearing at some distance further out. The many rapidly flowing rivers, the rich cultivation and, in a special degree, the wealth of forests together with the many towns and villages and the views of the encircling mountains free this part of the plain from any appearance of monotony. All the rivers flow towards the central line running from west to east formed at first by the Dora Riparia and from Turin onwards by the Po, which, from its volume of water and the force of its flow, has drawn their lower courses in an easterly direction as is shown in the Ticino, Adda, Oglio, and Mincio, while the Adige has been completely turned aside and pursues an independent course eastward across the deltaic plain. Although as true torrential rivers the streams of the Plain of Lombardy do not attract population to their banks, their valleys have played an important part as strategic lines in time of war.

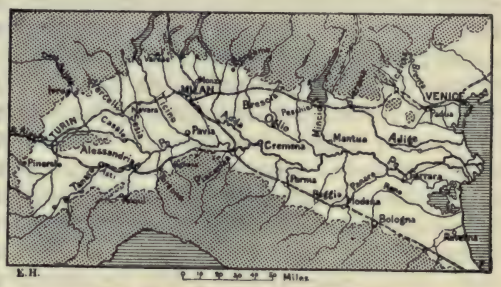

FIG. 184.—*The Plain of Lombardy.*

Configuration of the Appennines.—The Appennines present a fine example of a folded mountain chain broken off abruptly on one side by the sunken area of the Tyrrhenian depression. The parallelism of the successive chains is clearly shown in the northern and central Appennines by their arrangement *en echelon* so that the general south-easterly trend of the chains, like the wings of a theatre, pushes a more easterly before a more westerly which gradually falls off in height and is finally broken at the Tyrrhenian trough. Each chain thus forms a portion of the watershed until that function is taken over by a more easterly. In this way—and not as a simple chain—the mountain wall, which serves also as a dividing line of climates, is formed between Genoa and

Ancona, and about the 44th parallel separates Northern and Central Italy.

The *Northern Appennines* are usually separated into the Ligurian and Etruscan from the Col di Cadibona (1,600 feet high) which separates the Ligurian Appennines from the Alps, to the Bocca Serriola (2,400 feet). They have a small elevation both for crest and peaks, the highest summit being Monte Cimone (7,110 feet) which is crowned by a meteorological observatory. The northern section of the range is formed throughout of Tertiary strata, mainly clay, which, in spite of the moderate elevation of the passes (rarely above 3,000 feet) makes the construction and maintenance of roads very difficult. This is true, indeed, for the whole range of the Appennines as far as Sicily. Throughout the whole range also, the outer or eastern side is cut into blocks by the valleys of parallel streams which flow at right angles to the direction of the chain, *e.g.*, the Trebbia, Panars, and Reno, while on the inner or western side the rivers have been developed in the longitudinal valleys of the mountain-folds where they form a few large drainage systems and are much longer than those of the other slope. The chief western rivers are the Magra, Serchio, Arno, Tiber, Garigliano, Volturno, and Sele.

The *Central Appennines* may be divided into those of Umbria and the Marches in the north, and those of the Abruzzi in the south. They are very clearly distinguished from the Northern Appennines by the absence of the numerous intrusions of serpentine which distinguish the former, and by the increasing prevalence of limestones, principally Cretaceous, which give rise to steep bald slopes and wildly rugged crests and peaks. These have suggested the erroneous idea that the Appennines are a limestone range, whereas they really are mainly argillaceous. From Monte Nerone to the Matese mountains the country exhibits the karst phenomena of lakes, caverns, and powerful springs which give rise to permanent rivers. There are signs also of great vertical displacements or faults which here play an important part in mountain building. These dislocations are associated with the increased frequency and force of the earthquakes experienced towards the south. The Central Appennines contain some high summits, chief amongst which is the Gran Sasso d'Italia, 9,583 feet, and there are many peaks exceeding 8,000 feet. On the Tyrrhenian side the development of numerous folds of gentle curvature in the main chain forms extensive highlands such as those of Umbria and Abruzzi with sharply defined longitudinal valleys in which the rivers flow, and depressed intermont basins.

The *Southern Appennines*, beginning at the Vinchiaturo Pass (1,800 feet), may be divided into a Neapolitan and a Calabrian portion. The Neapolitan Appennines are characterised by the outcrop of older Triassic limestones along the whole Tyrrhenian side and by plateaux made up of flat-lying recent Tertiary strata, particularly on the eastern side. Traffic across the range is impeded not so much by the height of the passes (the two

important railways from Campania to the Apulian plain at Foggia and to the Gulf of Taranto hardly reach an elevation of 2,000 feet) as by the narrowness of the defiles which in former times played their part in military history, and later opposed great difficulties to the construction of railways. Monte Polino, with an elevation of 7,450 feet, rises in rugged limestone peaks above the valley of the Crati, which separates it abruptly from the gentler forms of the Archæan rocks of Sila in Calabria. The drainage of the Southern Appennines runs in regular parallel valleys of erosion eastward to the Adriatic, the Biferno Fortore and Ofanto, or southward to the Gulf of Taranto, the Bradano Basento, Agri, and Sinni. The Calabrian Appennines are mainly composed of fragments of the ancient Tyrrhenian crust-block, with remains of ancient sedimentary strata on the eastern side which formed a group of islands in Pliocene times and were only united by a Quaternary uplift as a narrow land bridge rising from a great depth between the Tyrrhenian depression on one side and the yet greater Ionian deep on the other. The flanking Tertiary zone of the Appennines is in this part submerged in the Ionian depression and only reappears in Sicily where it forms the broad southern slope of the island. The Calabrian range consists practically of the masses of the Sila mountains and of the Aspromonte. No point of it quite reaches 6,500 feet; its rounded, massive forms are explained by the gneisses, crystalline schists and granite of which it is composed. A usually narrow zone of the most recent formations borders the ancient rock masses; it is built up principally of the deltaic fans of the torrents and forms a coast line without shelter, so that Calabria remains a closed land to this day.

The Appennine Foreland.—A broad, low foreland formed by the unsubmerged border of the Tyrrhenian depression and gulfs filled up by river and volcanic sediments lies along the Appennine region from the Gulf of Spezia to that of Policastro. The line of fracture separating the two is distinct both orographically and hydrographically: all the rivers follow the longitudinal valley to which it gave rise, after leaving the Appennine region, and it is also one of the most important lines of communication in Italy, along which a railway runs from Pistoja and Florence to the Vallo di Diano which separates the mountains of Cilento from the Appennines. The broad belt of land cut off by this valley is partly composed of surviving fragments of Tyrrhenia, such as the highlands of Tuscany, partly of sunk portions of the Appennines, like the Lepini and Cilento mountains, and partly of small volcanic cones and craters containing lakes, such as the Albanian mountains and the Phlegræan fields with Vesuvius (Figs. 191 and 192), and finally of elevated portions of the sea-bed covered with volcanic ejecta, such as the plains of Rome and Campania, or river sediments of the Arno, Tiber, &c. As the Tyrrhenian Appennine foreland was first brought into contact with the Appennine region in the Quaternary period so also was the much lower foreland

on the Adriatic side. At the beginning of that period a strait ran from the Gulf of Taranto through the Plain of Foggia to the Adriatic and here, where a transverse fault crossed the great longitudinal crack, the mass of Monte Volturno (4,265 feet) was upheaved. From the depression, which is still easily recognisable, rise the heights of Monte Gargano and the chalk tableland of Apulia (Le Murgie) a poorly watered karst-land rendered very fertile in parts by a covering of loess.

The Italian Islands.—Of the many straits which divided the south of Italy into islands in Pliocene times only one, the Strait of Messina, has resisted the great Quaternary upheavals whose action produced the wonderful terraced scenery of Calabria. The Strait of Messina was produced by an exceptionally deep-seated fracture, which accounts for the severe earthquakes still experienced in Messina and Calabria. The crossing of this fracture by the fault which gave rise to the steep south-eastern scarp of Calabria is marked by the upheaval of the greatest of the Mediterranean volcanoes—the giant mass of Etna, which towers to the height of 10,740 feet. The triangular island of *Sicily* resembles the Appennine region in having its steepest slope to the Tyrrhenian depression out of which rise the volcanic Lipari Islands. This steep northern side is composed like southern Italy of Triassic formations, while on the outer side towards Africa soft Tertiary rocks, rich in sulphur, form a gently sloping tableland with a mean height of 1,450 feet which has been cut into a chaos of rounded hills by river-erosion and denudation. Except Etna, no mountain in Sicily attains 6,500 feet, and the highest summits all lie in the well-watered district near the north coast, the scenery of which is remarkably varied and picturesque. Its agricultural resources make this the most densely peopled part of the island, and in the strip of land from the sea-shore to the height of 160 feet the density of population reaches 2,530 per square mile.

Only the Peloritanian mountains in the extreme north-east of Sicily can be viewed as a relic of the ancient Tyrrhenia, but the whole of *Sardinia* is a portion of that vanished land. Sardinia is mainly composed of ancient crystalline rocks, especially granite ; but in the south there are Palæozoic strata rich in copper and silver-lead ores, and on the west side recent eruptive rocks appear. The island is almost all occupied by mountains covered with wasted forests and undergrowths, and with a raw climate, although no point reaches the height of 6,000 feet. The small plains are swampy and malarial, and of the little islands only Caprera, the dwelling-place of Garibaldi, need be mentioned. La Maddalena, now united to Caprera by a bridge, has been converted into a naval station commanding the Strait of Bonifacio.

Climate.—Its climate makes Italy one of the most favoured lands of the Earth, and the garden of Europe. The great wall of the Alps protects it from the northerly winter winds and from continental influences. The Appennines from Nice to Ancona form a second line of climatic defence, and the whole land is open to the south and to the equalising influence of the

Mediterranean, a sea filled to its greatest depth with water over 50° F. in temperature. The winters are mild everywhere, even in the Plain of Lombardy, and south of the Appennines the temperature seldom falls to the freezing point, and never goes far below it, while January in Sicily is like May in England. South of the 40th parallel the prevailing wind in summer is northerly, and tends to moderate the heat. The protection of the mountains forms veritable climatic oases close to the foot of the Alps, on the Ligurian coast, and at Amalfi and Salerno. Yet even in Sicily a little snow is no very rare occurrence. On account of the position of the Atlantic high pressure area to the north of Italy in summer and to the south in winter, the Italian summer is deficient in rain, and there is an accumulation of rainfall in winter, but towards the north the summer rainfall is not so deficient, and in some places at the foot of the Alps there is not much difference in the amount of precipitation in spring, summer, or autumn. In Sicily and Sardinia from 35 to 40 per cent. of the annual rainfall comes in the winter months. Hence the rivers, except those fed by the powerful springs of the limestone regions, are remarkably variable in volume. Floods and inundations occur in the rainy period with very high water during autumn, especially in the rivers flowing from the Alps, but in the centre and south of Italy the rivers are little more than dry stony beds during summer, and artificial irrigation is rendered necessary. The distribution of rainfall is determined by the configuration of the land. It is greater on the Tyrrhenian than on the Adriatic slope; greater on the southern margin of the Alps than on that of the Appennines, but greatest on the slopes of the mountains near Genoa, where it is 51 inches, and at Tolmezzo in Friaul, where it reaches 100 inches. The rainfall of northern Italy may be stated as about 40 inches on the average, that of central Italy about 32 inches, and of southern Italy not much more than 27.

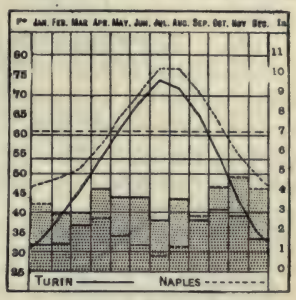

FIG. 185.—*Rainfall and Temperature of Turin and Naples.*

FIG. 186.—*The Malarial Districts of Italy, shown in stipple.*

Malaria, which is characteristic of all the Mediterranean lands, is particularly common in Italy, and is the greatest drawback to a land otherwise so favoured. Only six of the 69 provinces—Porto Maurizio, Genoa, Messa-Carrara, Florence, Pesaro, and Piacenza—are entirely free from malaria. It makes large areas un-

inhabitable and uncultivable in spite of the fertility of the soil, which can only be utilised for winter pastures, and it hampers the railway service. One-sixth of the population of Italy suffers from malaria, which causes 14,000 deaths per annum.

Flora and Fauna.—The flora of Italy is that typical of the Mediterranean region, at least so far as regards the centre and south, and along a broad belt of the west coast south of Liguria. It includes evergreen trees of kinds fitted to withstand the long drought; and the olive may be looked upon as the most characteristic growth. The olive is excluded from the Plain of Lombardy by the comparatively severe winter; but it appears along the immediate foot of the Alps, especially round the borders of the lakes, and it surrounds the whole coast of Italy, growing in Liguria to altitudes of nearly 2,000 feet, and in Sicily to 3,000 feet. The flora of central Europe prevails in the Plain of Lombardy, and in the mountains; in Sicily there are forests of chestnut trees between 2,000 and 3,000 feet, and of beech from 3,000 to 5,500 feet. The Mediterranean belt is characterised by the evergreen oak and pine, the Aleppo-pine, cypress, and especially a number of low evergreen and often thorny aromatic shrubs.

The fauna of Italy is poor, and has little of geographical interest. The reptiles (lizards), however, are almost too abundant, and so are the snails.

People.—The favoured land of Italy has been the goal of many migrating peoples both from the north and south, yet they all adopted one language, and at present unity of speech prevails in Italy to an extent unapproached in any other country of Europe. The people is ethnically remarkably mixed, and the contrast between the northern and southern Italians is very great. The mixture of races may be traced back to the great Roman trade in slaves, by which Phœnicians, Greeks, Berbers and Arabs from the south were brought into contact with Kelts, Germans, and Slavs from the north. Five ethnical groups are now believed to have inhabited prehistoric Italy. These were the *Iberians* in Sardinia, the *Ligurians* in Liguria, the *Italians* in the greater part of central and southern Italy, the *Illyrians*, in Venetia and Apulia, and the *Etruscans*, amongst whom the *Kelts* intruded themselves, in the Plain of Lombardy. All of these adopted the Latin language in the Roman period, but to this day traces of the primitive physical types may be recognised in the local dialects of Italian. In the south, especially in Sardinia and Calabria, the physical type is narrow-skulled (dolichocephalic), of short stature, with dark complexion and hair, while in the north the type is on the whole broad-skulled (brachycephalic), tall, fair, and light-haired. Of the dialects of Italian, Tuscan is considered the purest form of the language. In the valleys of the western Alps about 120,000 people still speak French, and in the east half a million Friaulians preserve their Rhæto-romanic tongue. A few German settlements in the Alpine valleys and some Slavs in Friaul and Abruzzi are almost all bilingual. There are also a few Albanians in Calabria and Sicily,

some Greeks in Apulia, and about 40,000 Jews, mainly in northern Italy and in Leghorn. Reckoning the Friaulians as Italians, there is a foreign population of only 1 per cent. on Italian soil, while about 5 per cent. of the Italian people live abroad, about one million in North and South America, and the others mainly in Switzerland, Austria, Corsica, and Malta.

History and Government.—The historical subdivision of Italy stands in the sharpest contrast to the physical unity and isolation of the land. The Romans united Italy first politically and then linguistically; the splitting up commenced with the fall of the Empire, and led to the establishment of foreign rule over larger or smaller areas by the Germans, Spaniards, French, and Austrians. Yet in spite of this the linguistic and intellectual individuality of Italy was never lost, and in the Middle Ages Italian influence on the rest of the world, on account of the power of the Pope in the Roman Catholic Church, was hardly less than in Roman times. In maritime trade the Republics of Amalfi and Pisa, and still more those of Venice and Genoa, dominated the world until the sixteenth century, and they also centralised a large share of the land-trade of Europe. In recent times Italy was united after the war of 1860, when six of the independent States combined to form the kingdom of Italy as a constitutional monarchy. To this Lombardy was added, and Venetia in 1866, both being reconquered from the Austrians, while in 1870 the last remnant of the Papal States was incorporated and Rome became the capital. The kingdom of Sardinia was the nucleus around which the united nation crystallised. The new kingdom was subject at first to great dangers and difficulties, not least those due to the fact that the citizens had not been trained to freedom and self-government, while a heavy national debt has involved excessive taxation under which the country still suffers.

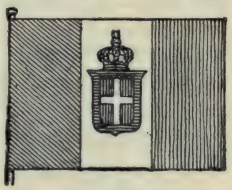

FIG. 187.—*The Italian Naval Ensign.*

Economic Geography.—Italy is destined by nature to be an agricultural country. The climate allows of all the crops of Europe and many of those of the tropics being grown, while in Sicily, by artificial irrigation, seed-time and harvest may occur at all seasons of the year. In the Campagna the irrigated meadows may yield as many as ten crops in the year, and in Lombardy from four to six. In almost all parts of the country two or three harvests can be reaped in one year from the same land. Artificial watering is very important in the north where the object is to increase the yield of the crops and to allow rice to be grown in the Plain of Lombardy, and in the south to allow of the growth of oranges and lemons. The irrigated area is nearly 8,000 square miles, and it can still be greatly increased. The yield is enhanced two or three-fold on the average, and as much as twenty-fold in Sicily, on account of the growth of oranges and lemons. The cultivation of southern fruit trees, especially of the olive, to which alone 3,500 square miles are devoted, gives to whole

countrysides the appearance of well-cultivated gardens. Terrace cultivation also is a characteristic of Italian agriculture. Wheat of exceptional quality is raised in Sicily, rice and maize are more grown in the north. Vineyards occupy about 8,000 square miles, and Italy is second only to France as a wine-producing country. Yet agriculture no longer stands at its former high level. The system of large estates and the prevalence of malaria renders great areas of the most fertile land unproductive. In some provinces only 18 per cent. of the land is under cultivation, and the average for the whole country is 37 per cent., while only 11 per cent. can be considered as naturally unproductive. Cattle-breeding is in a still worse position. Italy is poor in live stock, and it is only in the north, especially in Lombardy, that cattle are profitably kept for butter and cheese. There also poultry farming and artificial fish-breeding are largely carried on. In the centre and south the flocks and herds wander as the season changes from the mountains to the coastal plain and back again.

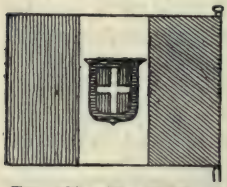

FIG. 188.—*The Merchant Flag of Italy.*

Trade and Communications.—In Lombardy, Liguria and Piedmont, silk spinning and weaving give employment to 200,000 people, and there are factories for woollen and cotton weaving and for the preparation of flax and hemp, as well as other industries.

The trade of Italy is mainly maritime; but the opening of the Alpine tunnels has developed a considerable land trade as well, bringing prosperity to Turin and Milan, and even making Genoa to some extent the port of south-western Germany. The mercantile fleet of Italy has recently been declining in importance, and now comes fifth amongst the nations; but Genoa, although mainly an import harbour, attracts much shipping, and is a serious rival to Marseilles. Most trade is done with France, and next with the United Kingdom, Austria-Hungary and Germany. The exports are chiefly agricultural products, the imports grain and textiles. The improvement of trade has been fostered since 1860 by the construction of harbours, railways, and roads on a scale attempted in few other countries—too much, indeed, for the finances of Italy if not yet enough for its necessities. The railway system amounts to about 7,500 miles, and there are also 1,200 miles of steam-tramways. For a land in which agriculture predominates, Italy is very densely peopled, even although many extensive districts, such as the neighbourhood of Rome, are entirely uninhabited, and the number of emigrants is steadily increasing on account of the poverty of the country.

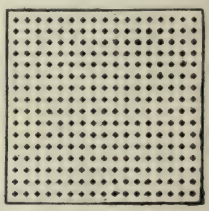

FIG. 189.—*Average population of a square mile of Italy.*

Towns of Northern Italy.—For administrative purposes Italy is divided into 69 provinces, differing greatly in area and population, and with

boundaries showing little relation to physical features. The old division into sixteen regions is better for geographical purposes. Five of these divisions—Piedmont, Lombardy, Venetia, Emilia, and Liguria—belong to northern Italy. They are the most important from an economic point of view and contain 45 per cent. of the population. The principal towns have, as a rule, grown up on the edge of the plain along the borders of the Alps and Appennines (Fig. 184). There is a town at the outlet of every mountain valley ; the larger the valley and the more important as an entrance to the mountains or a passage through them, the more important is the town, and the greater the part it has played historically. Only those, however, on which the Alpine and Appennine roads converge have become really great cities ; such for instance is *Bologna*, and, in a still higher degree, *Turin* and *Milan*. These also lie on the most important east-and-west line of communication, and are centres of a fertile and diligently cultivated neighbourhood in which manufacturing industries are well developed. Amongst the historically important towns of the plain are *Pavia* at the mouth of the Ticino, *Piacenza* and *Cremona* at points where the Po could easily be bridged, *Mantua*, a fortress in the midst of a defensive system of lakes ; *Padua*, an ancient seat of learning, and *Ferrara*, which dominated the trade on the waterways of the Po delta ; but their old greatness has waned. *Venice* (*Venezia*), a lagoon port unassailable alike by land or sea, which succeeded to the importance of Ravenna when the sea approaches to that town were silted up, now preserves only the shadow of the splendour it attained in the Middle Ages. *Genoa* (*Genova*), on the other hand, on account of the trade through the Alpine tunnels and because it is the true centre of the whole of Liguria, has grown in importance and secures still further advances by continuous improvements of the harbour. *Spezia*, on the border of Central Italy, is a purely naval port.

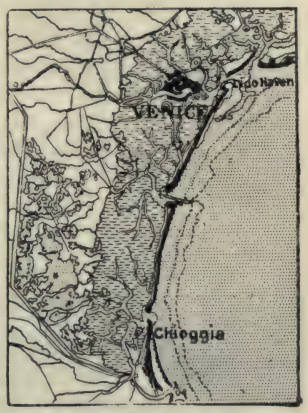

FIG. 190.—*The Site of Venice.*

English Miles
ROME
Tor Sapienza
Marcellina
Torre Nuova
Frascati
Albano
Castel Gandolfo
Genzano
Nemi
Velletri
Valmontone
Palestrina
Tivoli
Subiaco
Tor Tignosa
Fiano
Soracte
Civita Castellana
Nepi
Monterosi
Sutri
Campagnano
Porcareccia
Mazzanello
Braccianello
Pisana
S. Cosimo
Maccarese
Fregene
Ostia
Lido di Ostia
Torre Astura
Nettuno
Anzio
Porto d'Anzio
Velletri
Genzano
Albano
Nemi
Castel Gandolfo
Marino
Frascati
Grottaferrata
Rocca Priora
Rocca di Papa
Monte Cavo
Colonna
Zagarolo
Palestrina
Valmontone
Tivoli
Subiaco
Vicovaro
Mandela
Monte Gennaro
Monte Libretti
Monte Pellecchia
Monte Elce
Monte Lucano
Monte Guadagnolo
Monte Semprevisa
Monte Calvo
Monte Terminillo
Monte Velino
Monte Cagno
Monte Cornacchia
Monte Sirente
Monte Ocre
Monte Cefalone
Monte Cefalone

Towns of Central Italy.—This division includes the regions of Tuscany, the Marches, Umbria, Rome, Abruzzi, and Molise, and contains 21 per cent. of the population. The coasts are unfavourable, and the only seaport requiring mention is the artificial harbour of *Leghorn* (*Livorno*) taking the place of *Pisa* which was silted up long ago. The centres of population are dependent on the north-and-south lines of communication, *e.g.*, *Siena*, *Perugia*, *Florence* (*Firenze*), and even Rome itself, each of which is connected with the passes of the Appennines and is also the chief town of a rich agricultural neighbourhood. *Rome* (*Roma*), founded on a group of tufa hills at a crossing-place of the Tiber, and the mouth of the Anio, indeed in some respects commanding the mouth of the Tiber itself, occupies a remarkably favourable position for the Tyrrhenian coast (Fig. 191). At the same time the convenient route across the Appennines to *Ancona* on the Adriatic and thence by *Rimini* to northern Italy makes it almost the geometrical centre

FIG. 192.—*The Environs of Naples.*

of the peninsula. On this account it has become the capital of united Italy, and so entered upon a third period of prosperity, the former epochs marking the climax of the greatness of the ancient and the mediæval world. No city approaches it in the number and interest of its historical associations. The ruins of the ancient Forum and Colosseum are grand relics of ancient Rome, while the Cathedral of St. Peter's is the most famous church in the world. The King of Italy resides in the Quirinal; the Pope lives in seclusion in his palace of the Vatican.

Towns of Southern Italy.—The regions of Campania, Apulia, the Basilicata, Calabria, Sicily, and Sardinia form Southern Italy with 34 per cent. of the population of the country. All the important towns of this division are situated on the coast. The comparatively easy conditions of life in the fertile Campania have caused *Naples* (*Napoli*) to grow into the largest city of Italy. Its surroundings are of rare beauty, and the climate is typical of the south at its best, while the neighbouring town of *Pozzuoli*

stands in the midst of vast ruins of the Roman period. The ancient Roman watering-places of Herculaneum and Pompeii at the base of Mt. Vesuvius, destroyed and buried by the great eruption of A.D. 79, have been to a large extent excavated, and the old streets and houses have become once more a centre of attraction for pleasure-seekers. *Amalfi* and *Salerno* have shrunk to shadows of what they were, but the fine natural harbours of *Brindisi* and *Tarento* have given a new lease of prosperity to these towns, and they rank next to *Bari*, the largest of the coast towns of Apulia.

Palermo, the capital of Sicily, stands on a grandly sheltered bay of the north coast, facing Italy, in the middle of a vast forest of fruit trees. On the eastern side turned towards Greece, *Syracuse*, once the chief town of the Greek world, has fallen into decay, and is surpassed in importance by *Catania* at the foot of Mount Etna on the shore of the Strait of Messina. For centuries during the Middle Ages and even in antiquity, Sicily maintained the closest relations with Africa, and *Girgenti* on the south coast was then a flourishing town.

In Sardinia the chief towns, *Cagliari* on the south and *Sassari* in the north, have never had more than local importance.

STATISTICS.

	1881. (*Census.*)	1901. (*Census.*)
Area of Italy in square miles	110,684	110,684
Population	28,459,628	32,449,754
Density of Population per square mile	257	293

POPULATION OF LARGE TOWNS.

	1881.	1901.		1881.	1901.
Naples (Napoli)	463,000	564,000	Catania	96,000	150,000
Rome (Roma)	273,000	463,000	Leghorn (Livorno)	79,000	98,500
Milan (Milano)	296,000	491,000	Ferrara	28,800	87,700
Turin (Torino)	230,000	336,000	Padua	47,300	82,300
Palermo	206,000	310,000	Lucca	20,400	74,700
Genoa (Genova)	138,000	235,000	Alessandria	30,700	71,300
Florence (Firenze)	135,000	205,000	Bari	58,200	79,700
Venice (Venezia)	129,000	152,000	Verona	60,700	74,200
Bologna	104,000	152,000	Brescia	43,300	70,600

ANNUAL TRADE (*in pounds sterling*).

	1871–75.	1881–85.	1890–94.
Imports	52,600,000	59,400,000	52,000,000
Exports	48,200,000	49,800,000	42,500,000

STANDARD BOOKS.

H. Nissen. "Italische Länderkunde," Bd. I. Berlin, 1883. Bd. II., "Die Städte." Berlin, 1902.
Th. Fischer. "Länderkunde von Europa herausgegeben von A. Kirchhoff," Bd. II. 2. Hälfte s. 285–515. Prag, 1893.
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II.—SAN MARINO

The Republic of San Marino.[1]—The city of *San Marino*, picturesquely massed on a rocky height about ten miles south-west of Rimini, is the centre of the most ancient and the smallest republic in the world.

[1] By the Editor.

This little State, with an area of only 23 square miles and a population of 8,000, is entirely surrounded by Italian territory, but remains quite independent of Italian jurisdiction. The supreme authority is vested in a Senate of sixty members elected for life. The foreign relations of San Marino are necessarily with Italy alone, and a treaty of friendship with that Power is the only international agreement necessary.

III.—MALTA

By Lieut.-Col. Sir R. Lambert Playfair.

Position and Resources.—The Maltese group consists of two principal islands, Malta and Gozo, separated from each other by a channel three miles broad, in which are the islets of Comino and Cominetto, while off the south-west coast is the small rock called Filfila. Malta is situated in lat. 36° N., and long. 14½° E. on the bank which connects Sicily with the African continent, and which here divides the Mediterranean into an eastern and a western basin. Its distance from Sicily is sixty miles, and from Cape Bon in Africa about two hundred. These islands are the insignificant remnants of land now submerged, which must at one time have been covered with an extensive flora, the home of gigantic mammals and reptiles, the remains of which have been preserved in the fissures and caves of Malta.

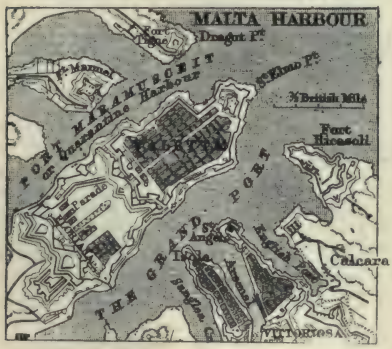

Fig. 193.—*Valetta and the Harbour.*

Although they are mere rocks cropping out of the ocean (Malta only contains 95 square miles), they are happily covered with a thin, rich mould, which enables a larger number of people to live on them than on any other equal number of square miles on the surface of the globe. The great enemy to vegetation is the violence of the wind, which necessitates the gardens being made small and surrounded with high walls, so that from a distance the place looks like huge stone quarries. Yet enormous crops are raised, and fruit of all kinds and of excellent quality is grown in abundance. The flora greatly resembles that of Sicily. The flowers have long been celebrated, and in springtime give an appearance of great beauty to some of the valleys; others, however, are bare and rocky, and yield little beyond a few carob-trees and prickly pears. The indigenous mammalia belong to well-known European species; migratory birds visit the island on their passage across the Mediterranean, but only seven species remain there throughout the year.

Amongst the reptiles are several snakes, but all harmless; St. Paul is said to have banished the venomous ones, as St. Patrick did in Ireland.

History.—Malta, from its commanding position, midway between Gibraltar and Egypt, and its magnificent harbour, has always been a position of the greatest importance, and at present is one of the strongest fortified positions of the British Empire. The most interesting part of its history is comprised in the 268 years during which it was subject to the Knights of St. John, or Hospitallers, as they were called. After their expulsion from Rhodes, Malta and its dependencies were made over in perpetual sovereignty to the Order by Charles V., and the knights arrived here in 1530, under their Grand Master, L'Isle Adam. The Turks made repeated vain attempts to expel them; their greatest and final effort being in 1565, when the siege lasted about four months. The final disaster which befell the Order was in 1798, when the island was taken by the French under General Bonaparte, but they soon made themselves so unpopular by their unsparing policy of plundering the churches and charitable institutions, that an insurrection broke out. A British squadron was sent by Nelson to blockade the harbour, and the French surrendered from famine on September 5, 1800. In 1814 the island was finally transferred to the United Kingdom by the treaty of Paris.

Government, People and Towns.—The government now consists of the Governor-General, who is also commander-in-chief of the forces, and an Executive Council consisting of six official and fourteen elected members—all natives of the island. The language of Malta is a corrupt form of Arabic, mixed with ancient Phœnician and modern Italian words. *Valetta*, the capital on the grand harbour of Malta, is full of splendid buildings; the great object of admiration is the Church of St. John, remarkable for its historical associations and the richness of its decoration; there are many magnificent *auberges* or palaces of the Knights, and the whole island is full of fine buildings and objects of archæological interest, probably of Phœnician origin. St. Paul's Bay, the traditional scene of the apostle's shipwreck, is the site of ruins supposed to have been occupied in his time.

FIG. 194.—*Colonial Badge of Malta.*

STATISTICS.

	1900.
Area of Malta and adjacent islands in square miles	117
Population " "	183,679
Density of population per square mile	1,570
Population of Valetta	65,000 (?)

CHAPTER XXI.—THE IBERIAN PENINSULA

I.—SPAIN

By Dr. Theobald Fischer,[1]
Professor of Geography in the University of Marburg.

The Iberian Peninsula.—The Iberian Peninsula, the south-western promontory of Europe, is a world in itself, and a world of contradictions. Although the sea surrounds seven-eighths of its periphery, it has all the features of a continental mass with restricted access to the ocean; forming a huge square, or rather pentagon, with an average elevation of 2,200 feet, and terminating on its seaward faces in a high, straight and little indented shore. Although situated between the Atlantic and the Mediterranean, and between central Europe (France) and Africa, its ranges of east-and-west mountains serve rather to separate than to unite the continents. There are almost no well-marked inlets on the coast, and few navigable rivers, or off-lying islands; the inland routes are made difficult by the many mountain passes. The Iberian Peninsula thus provides no traffic route between the ocean and the Mediterranean nor between the Mediterranean lands and north-western Europe. In the course of a long history the relations have been closer with the southern neighbour Marocco than with the northern neighbour France, so that there is some truth in the French proverb—"Africa begins at the Pyrenees." This position, together with certain peculiarities developed in the people by their five-century-long struggle with Islam, have thrown obstacles in the way of real development. Only one of the many clearly characterised natural regions of the peninsula, Portugal, has acquired importance as a maritime Power: and this also alone amongst the ancient kingdoms has remained an independent State. Its territory was marked out for the seat of separate national life by the gorges of the Minho in the north, the Guadiana in the south-east, and the deep canyons of the Douro and Tagus cutting it off from the rest of the plateau and forming splendid harbours in their estuaries.

Configuration of the Meseta.—The broad geographical features of the peninsula are explained by its geological structure. Three-quarters of the peninsula is composed of an ancient and much altered block of the Earth's crust which may be termed the *Iberian Meseta;* on its margins two younger land masses were upheaved by tangential thrust into lofty border-

[1] Translated from the German by the Editor.

ing ranges, the Pyrenean-Cantabrian on the north and the Andalusian on the south. The Meseta is made up, for the greater part, of a wide tableland of flat-lying strata, its mountainous edges on the west and east turned towards the ocean and the Mediterranean contrasting sharply with the central plateau. The Iberian Meseta is mainly composed of Archæan and Palæozoic rocks, especially those of Cambrian, Silurian and Devonian formation; their fractured edges looking down on the plain of Andalusia in the south and on that of Aragon in the north. Towards the close of the Palæozoic period these strata had been upheaved into a vast mountain chain broken through by masses of granite, which was later reduced by marine action and long-continued atmospheric erosion to a uniform surface, a peneplain, in the south-west. This was in large part covered over with Mesozoic continental strata, particularly Cretaceous and Tertiary; and in part by lacustrine deposits. The general uniformity of the surface of the wide high plains contrasts with the more varied character of the borders of the Meseta. As a whole, the Iberian tableland slopes gently westward to the ocean. Its highest part is the Iberian Border Range which separates the plateau of Castile from the Ebro basin and both from the narrow coastal plain of Valencia, a district which over an area of about 15,000 square miles attains an average elevation of from 3,500 to 5,000 feet. A greater variety of scenery is only found in the Main Dividing Range which has been formed by successive fractures and vertical movements, giving rise to a series of crust-block mountains which, starting at the mouth of the Tagus, follow each other *en echelon* from the south-west towards the north-east. These heights separate the basin of the Douro from that of the Tagus, the province of Old Castile from that of New Castile. Although in this region there are some lofty summits such as the Plaza Almanzor, 8,730 feet, in the *Sierra de Gredos*, and the Pico de Peñalara, 7,890 feet, in the *Sierra de Guadarrama*, yet these summits only rise about 5,000 feet above the level of the plateau. The so-called *Sierra Morena* is nothing more than the steep southern edge of the Meseta bordering the great valley of the Guadalquivir. The parallel *Sierra de Toledo*, which forms part of the watershed between the Tagus and the Guadiana is a denuded highland of small relative elevation composed of a series of

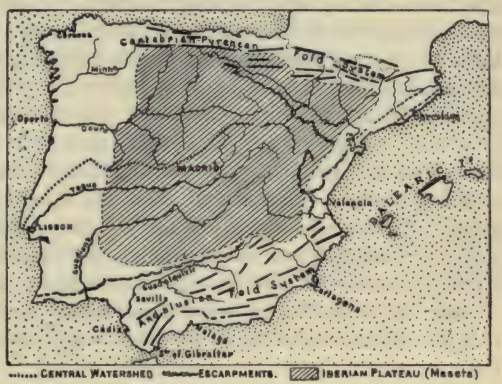

FIG. 195.—*Physical Structure of the Iberian Peninsula.*

steep saddles of Cambrian and Silurian quartzite closely following one another in a north-west and west-north-west direction, similar in character to the German Taunus. While the more recent formations of the plateau yield no minerals, except salt, and form featureless expanses of arable or pasture land, the older strata, especially towards the margins of the plateau, are rich in all mineral wealth.

Hydrography of the Meseta.—The drainage of the Meseta is effected along more or less parallel river valleys towards the west : the Minho, Douro, Tagus, and Guadiana, and, most amply supplied of all, the Guadalquivir. This river, however, draws the greatest part of its supplies from the high mountains of Andalusia, but the fault which gave rise to the Andalusian plain also outlines the steep edge of the plateau. The name Guadalquivir means Great River, and it has a right to be so called because it is the only river of the peninsula navigable to any distance from the sea, vessels being able to ascend it as far as Seville. The other rivers are of less importance, flowing in the deep rocky valleys which their streams have cut through the plateau, poorly supplied with water, not navigable, difficult to cross, and so far sunk below the general level as to be useless even for irrigation. At the northern end, the smaller Ebro, which in many respects contrasts with the Guadalquivir, flows through a similar valley defined by the boundary fault of the Meseta forming the narrow depression of Aragon, which is connected with the Mediterranean only by a tortuous gorge. Its largest tributaries, the Aragon and Segre, bringing in a great supply of water from the slopes of the Cantabrian mountains and the Pyrenees render it particularly advantageous for irrigating the lowlands of Aragon ; and the Imperial Canal which has been constructed parallel to it would itself be a most important waterway if the situation were more favourable.

Configuration of the Fold-Mountains.—The Andalusian plain and the Ebro basin separate the Meseta from the chains of fold-mountains in the north and south. Nowhere is there a greater contrast in scenery. The Andalusian system of crust-folds consists of a low outer zone of folded Mesozoic and Tertiary strata, and a lofty inner girdle in which the Archæan and Palæozoic rocks are thrust up so steeply above the Mediterranean depression that Mulahacen, the loftiest summit of the *Sierra Nevada* and of all Europe outside the Alps, rises to a height of 11,420 feet at a distance of only 22 miles from the coast. This system of folds begins at the transverse dislocation which separates it from the Atlas mountains and in Pleistocene times gave rise to the Strait of Gibraltar. It extends west by north, and is crossed by a series of transverse valleys at Malaga, Motril and Guadiz, the tectonic character of which is indicated by the frequency of earthquake shocks and by the deep bays, now almost silted up, at the mouths of the rivers. It ends at the Cabo de la Nao ; but the line of the Balearic Islands, Ibiza, Mallorca and Menorca (or Ivizo, Majorca and Minorca), and some smaller ones, continues in the same direction

and their structure shows that they are the continuation of the folded chain.

The lofty boundary wall of the *Pyrenees* in the north is also a fine example of a young folded mountain system built up of parallel belts and chains, their direction being usually west-north-west. On the east they are broken off at Cape Creux, while on the west they are separated from the Cantabrian mountains by no definite geological dividing line. The Cretaceous and Eocene belts of the western Pyrenees continue on the Spanish side as the southern belt of the Cantabrian mountains with the same character as far as Asturias. But there is a depression in the Cretaceous mountains in the Basque Province south of San Sebastian, possibly connected with the formation of the Ebro basin, which gives passage to the most important roads from France. In Asturias, the ancient formations of the Meseta, including some coal-bearing strata of the Carboniferous, have been much folded and contorted. Rocks of the newer Palæozoic series, together with the Eocene and Miocene folds of the Pyrenees, unite in the structure of the Cantabrian mountains, which attain their greatest height in the Picos de Europa (Torre de Cerredo, 8,670 feet), scarcely 19 miles from the sea. The wildness of the scenery on this mountain border, trenched with the deep furrows of eroded valleys, may be judged from the fact that it was only with difficulty that a piece of level ground could be found in Asturias long enough to serve as a base-line, under a mile in length, for a trigonometrical survey. The loftiest summits of the Pyrenees, formed of the central core of crystalline rock, occur in the Montes Malditos in Aneto, which are 11,168 feet high; but the peaks of the Tres Sorores (Mont Perdu), of Cretaceous formation, reach 10,997 feet. Just as the narrow and easily defended passes of the Andalusian fold-mountains enabled the Moors of Granada to hold their own for centuries against the Christians, so the small enclosed mountain valleys of Sobrarbe in the Pyrenees, and of Liebana and Valdeon in the Picos de Europa, formed the last refuges of Christians during the Mohammedan supremacy, and the centres from which they reconquered the land. The Meseta is entirely wanting in such natural strongholds.

Climate and Vegetation.—In spite of the length of its coast-line the Iberian Peninsula has a climate which may almost be termed continental, being characterised by large range of temperature between summer and winter, great and rapid variations of temperature, and remarkable dryness, resulting from the arrangement of border mountains and plateau. In the north and north-west, from the border of Portugal to the boundary river Bidassoa, there is an oceanic climate with mild winters, cool summers, and rain at every season. The vegetation is that of central Europe, and in some places cider is even the national drink. But in the interior the air is everywhere dry; and in the south-east the province of Murcia is so hot and arid that it is the only part of Europe in which the date palm ripens in true oases, for example at Elche. Artificial irrigation is absolutely

necessary for agriculture in that region and all along the whole Mediterranean border, except for the irrigated huertas, the vegetation has a steppe-like character, the predominant cultivation being esparto grass for paper-making. The coast-strip of the Mediterranean between Gibraltar and Almeria, sheltered by the lofty Andalusian chain, possesses the warmest winter climate of Europe. In the small well-watered coastal plains of Malaga and Motril sugar-cane is cultivated on a large scale, and the banana, the Peruvian cherimaja, and other tropical plants, grow luxuriantly. The mean temperature of January there is 55° F., and frost and snow are extremely rare; but at Madrid, in the centre of the peninsula, skating can often be indulged in, although in summer the temperature may go up to over 107° F. in the shade. The climate of Madrid is the most extreme in western Europe.

Rainfall is most abundant around the border region in winter: in the interior, spring is usually the season of maximum rain, but in some parts the rainiest season is autumn. As a rule the quantity of total precipitation diminishes from the north-west towards the south-east, but in La Mancha, and other parts of the plateau it is so small that the soil remains charged with soluble salts and in consequence only bears steppe-like vegetation. Yet tremendous and sudden bursts of rain are apt to occur in all parts of the peninsula, giving rise to serious floods. With such climatic conditions it is natural that both plant and animal life should exhibit great contrasts in their nature and in their distributions. Barely half of the country has a predominant Mediterranean flora, characterised by evergreen shrubs. The cold of winter and the excessive dryness of summer make such vegetation impossible in the greater part of the highlands of New Castile. The south-western half of the peninsula, especially Estremadura, is rich in thickets of aromatic evergreen shrubs. The mountains of the northern border, and also those of the Main Dividing Range, bear forests of a central European type.

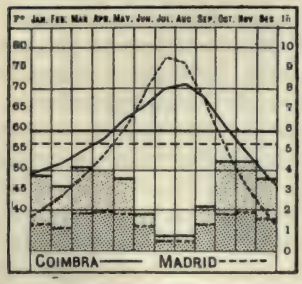

FIG. 196.—*Mean Monthly Temperature and Rainfall of Coimbra and Madrid.*

People and History.—The Iberians appear to have been the oldest inhabitants of the peninsula, and to form the basis of the present Spanish, or rather Castilian, race. Their language still survives, if the dwindling remnant of the Basques, less than half a million of whom live in the mountains of the extreme north-east, may be looked upon as their descendants. Keltic invaders early obtained a footing in the north-west. The Romans civilised almost the whole peninsula, by the establishment of strong military colonies. The immigration of Suevi, Alemanni, and West Goths did not suffice to change the established Roman language and affected the

physical type of the Spaniards only in a few places, for example in the Sierra de Bejar, one of the most isolated districts of the Main Dividing Range. The incursion of the Arabs and Berbers (Moors) had a much deeper influence on the country, affecting not only the physical type of the people, but their customs and the geographical names, as is well seen in Valencia, Murcia, and Andalusia, where numerous traces of the Mohammedan invasion remain. The Castilian language itself has incorporated many Arabic words. A large fraction of the African immigrants remained in the country and were absorbed; the Jews alone were completely and permanently driven out. The kingdoms of Castile and Aragon, which existed separately for 700 years, and others, were created through the existence of sharply defined natural regions; and it was only in the fifteenth century that these became united, so that only two States now occupy the peninsula. This history explains the contrasts in physical type, customs, and organisation between the people of the separate districts, especially between the Andalusians, Castilians, Aragonese, and Catalonians. The few traits which the whole Spanish people have in common, their military spirit and religious fervour and intolerance, may be traced to the eight centuries of struggle against Islam. For a century the possession of the rich colonies of America made Spain the mistress of the world, but the small esteem in which civil occupations were held has led to the loss of all the valuable colonies, and the impoverishment and depopulation of the mother country; the unabated but hollow Spanish pride is now a serious drag to all progress. Besides the predominant Castilian dialect, Catalonian, which is nearer to the French Provençal, is spoken, written and even used in education throughout Catalonia and the adjacent provinces of Valencia and Aragon. The Gallegos, near the frontier of Portugal, not only resemble the Portuguese type in appearance, but speak several old-fashioned dialects which approach closely to Portuguese. The diversity of the provinces plays an important part in the modern history of Spain, and there is room to doubt whether Spain can continue to exist as a single country.

Agriculture.—At least half, perhaps three-quarters, of the people depend directly on the fruits of the soil, which also supply two-thirds of the exports. In the Mediterranean belt of huertas, the rock has to be blasted and then powdered with hammers to form soil, the slopes of all the hill-sides are terraced, and every available fertilising agent, even the sweepings of the streets, is utilised, while artificial irrigation of a highly elaborate kind is resorted to in order to produce the utmost possible yield. On the other hand vast stretches of fertile land on the plateau remain entirely untilled, or else are cultivated in a destructive fashion, without the use of manure or irrigation. The apathy of the people makes all progress impossible; the multiplication of large estates, the depopulation of the country districts, absence of roads and want of capital are other causes which have contributed to this result. Almost everywhere, even in the midst of the most flourishing huertas, the tillers of the soil live in the

deepest poverty, a fact which explains the frequency of socialistic and communistic outbreaks. About 40 per cent. of the country is under cultivation, and 9 per cent. is artificially irrigated; but nearly 15 per cent. consists of fertile soil lying waste. In Murcia the productiveness of the ground is increased thirty-seven times by artificial watering. The huertas are mainly devoted to fruit trees such as the orange, date-palm, and pomegranate; but here and there rice, ground-nuts, cotton, sugar-cane, maize, tomatoes, onions and vegetables of every kind are grown. Wheat yields a hundred fold, and lucerne may be cut ten or twelve times in the year. The olive and vine are largely cultivated on unwatered land, mainly on the low grounds. On the highlands of course the nature of the cultivation is more uniform; trees lose their importance, and in many places disappear, the tableland being characteristically treeless; even the mountains have been despoiled of their timber and rise in bald, rocky, and barren slopes. Wheat is an important crop everywhere, the province of Valladolid is called the granary of Castile; yet grain has sometimes to be imported to make up the supply for home consumption. The moist northern border bears groves of the fruit trees common in central Europe; maize and millet are cultivated, and there are green meadows on which cattle are reared for export to England. The great stretches of dry pasture on the tableland, on the contrary, are only useful for sheep farming, an occupation which was formerly much more prosperous than now. The flocks are driven down in winter to the warm and low-lying districts of the south, returning to the highlands in spring. The forests of evergreen oaks in Estremadura make swine-keeping profitable, while Andalusia is famous for the breeding of horses and of bulls for the public bull-fights, a cruel sport confined to Spain and Spanish-speaking countries.

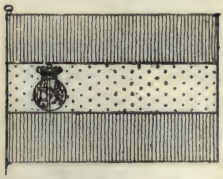

FIG. 197.—*Spanish Naval Ensign.*

Mining.—Spain has been the classic land of mining industry since the time of the Phœnicians. The variety of the mineral wealth in the marginal mountains is astonishing. They yield large quantities of lead and silver, particularly in the south-east from Adra to Cartagena; almost one-quarter of all the copper produced in the world is mined near Huelva on the Rio Tinto; the mercury mines of Almaden have been famous for centuries, and the splendid iron ore of the north coast supports an immense trade. Near Oviedo and elsewhere coal is mined. At present the mines are worked mainly by foreign capital, and in some years the output is worth as much as $30,000,000. During the nineteenth century a certain amount of industrial activity has been developed, chiefly in Catalonia and the Basque Province, where it is favoured by the proximity of mineral wealth, the abundant supply of water-power, and cheap sea transport. The chief industry is the manufacture of iron and machinery; cork-cutting and tobacco manufacture are characteristic, and cotton spinning is important in Catalonia.

Trade.—In spite of its fine position for trade with all parts of the world Spain now takes but a small share in international commerce. The internal trade which is stimulated by the different character of the various natural regions is rendered difficult by the configuration; roads and railways have to be carried across the marginal mountains by very costly engineering works, the general traffic centre of the country being Madrid in the centre of the tableland. From historical causes such foreign commerce as Spain retains is mainly with its former colonies, especially Cuba and the Philippines, but the shipping in Spanish ports is almost all under the British or French flags, the Spanish mercantile marine being very small. Commercially Spain depends most largely on France; the railways, for instance, were built by French companies, and one-third of the foreign trade is done with that country, more however by sea than by land. One quarter of the trade is with the United Kingdom. The value of the exports of home produce, mainly wine and minerals, exceeds that of the imports, which consist chiefly of cotton, coal, wood, sugar and fish. There are fisheries of some value on the coasts of Galicia and Andalusia; but the frequent fasts of the Roman Catholic Church to which practically the whole population belongs, make a constant demand for salted and dried fish from abroad.

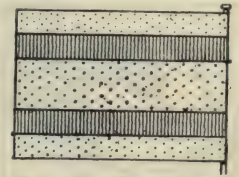

FIG. 198.—*The Merchant Flag of Spain.*

Natural Divisions and Towns.—Judged by the number of inhabitants, the small density and slow increase of population, Spain is to be classed with countries of the second rank; it could support three times as many inhabitants as it contains. The distribution of the people accentuates the contrasts between the natural regions. There is a comparatively dense population on the slopes of the bordering mountains, while on the plateau vast stretches of country, like the *despoblados* which occupy 2,000 square miles south-west of Toledo, are practically uninhabited; and in those regions even the population of the provincial capitals is diminishing. Except Madrid, all the large towns lie on the margin of the tableland, which is the only part of Spain where progress is being made, and contains 66 per cent. of the population of the country on 45 per cent. of the area. There the people live in thickly sown villages, and in the Basque province and Galicia in hamlets and isolated farms; but on the plateau, in spite of the complete dependence of the peasants on agriculture, they are grouped entirely in towns scattered 15 or 20 miles apart, the groups of low houses standing on the bare plain with no sign of tree or shrub about them. Spain is poor in large towns, even the capitals of the 48 provinces, arbitrary political divisions without geographical meaning, are small as a rule; those of the historical regions—the former kingdoms—are larger. All the im-

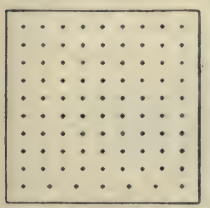

FIG. 199.—*Average population of a square mile of Spain.*

portant towns of the marginal belts naturally stand on the sea coast. The fine natural harbours of Galicia have allowed of the establishment of the naval port *Ferrol* and the commercial towns *Corunna*, *Vigo*, and *Pentevedra*; but the ancient capital, *Santiago di Compostela*, famous of old as a place of pilgrimage, lies in the interior. Similarly in Asturias *Oviedo* is an interior town, while its harbour *Gijon* grows rapidly on account of the development of the neighbouring mines. The same is true of *Santander*, the most northerly harbour of Castile, and of *Bilbao* and *San Sebastian*, the chief ports of the Basque province, all of which have a large export of iron ore to the United Kingdom. *Pamplona* and *Vitoria* are fortresses commanding the land routes between Spain and France on the west. In Old Castile the towns of the border district of the tableland include *Leon* and *Astorga* in the north, *Salamanca*, *Avila*, *Segovia*, and *Burgos* in the south, all of them extraordinarily old fashioned, rich in historical memorials, but showing signs of present decay. The hydrographic, and almost geometric, centre of the Douro basin is the larger town of *Valladolid*. In New Castile the peculiar predominant land-forms have also given the marginal towns the highest degree of development; but the central position of this region in the heart of the whole peninsula has introduced other conditions which led to the importance of *Toledo* on the Tagus, the former capital, and still more to that of *Madrid*, the modern capital. Madrid has grown more and more important as a focus of railways, has increased rapidly in population, and grown to be the head and heart of Spain in spite of its situation in a region of little charm, with an unpleasant climate. It has no historical associations, its people have come together merely because all the lines of communication between the marginal towns run through the capital, and it has become the seat of great educational institutions and financial and commercial establishments. The only town of Estremadura requiring mention is *Badajoz* in the Guadiana valley, a fortress on the Portuguese frontier. In lower Andalusia there are three notable towns connected with the Guadalquivir, *Cordoba*, now a mere shadow of its former greatness, but still famous for its splendid cathedral which was once a mosque; *Seville* with many art treasures, and important on account of manufactures and trade; and *Cadiz*, a fortified naval harbour which may be looked upon as commanding the entrance to the river. In upper Andalusia

FIG. 200.—*The Harbour of San Sebastian.*

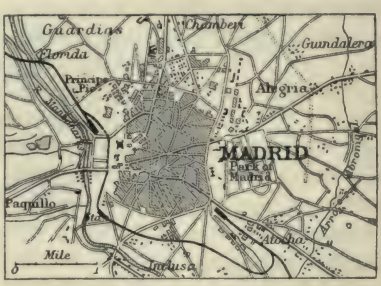

FIG. 201.—*Madrid.*

Granada is made famous for ever by the natural beauty of the neighbouring *Vega* and the exquisite architecture of the Moorish Alhambra. *Malaga* is the export harbour for the wine and fruits of the fertile coast border of Andalusia. More to the east *Almeria* and *Alicante* are small seaports, but at the same time, like *Murcia*, characteristic huerta towns, they give their names to the districts of which they are the centres. The naval port *Cartagena* owes its importance primarily to its splendid harbour, but recently mining has added to its prosperity. *Valencia*, now the third Spanish city in size, has become prominent because it is the centre of the richest part of the coastal plain. Catalonia abounds in towns and in industry; chief amongst its harbours is the ancient town of *Barcelona*, now the second in Spain and still rapidly growing; it has long since cast into the shade the anciently renowned port of *Tarragona*. The natural centre of Aragon is *Zaragoza* on the Ebro, which eclipses all the other towns of the basin of that river.

The Islands and Presidios.—In the **Balearic Islands** the chief town of the largest island is *Palma*. The harbour of *Mahon* on Menorca dominates the whole north-western basin of the Mediterranean. The Spaniards also reckon with Spain the volcanic group of the **Canary Islands** belonging geographically to Africa. The **Presidios,** or Spanish possessions on the coast of Marocco, are also viewed as part of Spain. *Melilla* and *Ceuta* are the most important of these.

The colonial possessions of Spain were once enormous, but have gradually diminished as the old colonies became independent republics. The last valuable possessions in America were lost when the Philippine Islands, Cuba and Porto Rico were transferred to the United States in 1899. There remain only a strip of the Sahara coast, and the islands of Fernando Po, Annobon, Corisco, and Eloby in Africa, none of any importance.

Andorra.[1]—A lofty valley on the southern slope of the Pyrenees, surrounded by high mountains, forms a separate State, "the Valleys and Sovereignty of Andorra," which has maintained its independence for a thousand years. Its area is only 150 square miles, and the population does not exceed 10,000; the people are more akin to the Spaniards than to the French and speak a Catalan dialect. The valley of Andorra is drained by the Valira, a tributary of the Segre, and is approached from the Spanish city of Urgel by a mule-path along the steep gorge of the river. It may also be reached from the French town of Ax on the northern slope by a very rough track crossing the crest of the range. The altitude of the valley is about 3,000 feet, and its only resources, apart from a little trade and a good deal of smuggling between France and Spain, consist in the tilling of the infertile soil and pasturage on the steep mountain-slopes. The isolation of the valley of Andorra has made it the resting-place of many curious ancient laws and customs. The little State is governed by

[1] By the Editor.

a Council elected by the heads of families and presided over by a Syndic who is appointed for one year. The French Republic and the Spanish bishopric of Urgel, however, exercise certain rights of suzerainty, and each has a representative in Andorra charged with all matters of external policy and justice. The organisation appears to be rather a feudal survival with a divided allegiance than what is usually understood as a republic. The people of Andorra have the reputation of being quiet and taciturn; they are much attached to their old ways and ancient priveleges, and live with austere simplicity. The capital, *Andorra la Vieja*, is a plain stone-built little town of 2,800 inhabitants.

STATISTICS.

	1877.	1887.	1897.
Area of Spain (including Balearic Is.), square miles..	192,004	192,004	192,004
Population „ „	16,341,201	17,246,688	18,089,500
Density of population per square mile	85	89	92

POPULATION OF CHIEF TOWNS.

	1877	1887.	1897.		1877.	1887.	1897.
Madrid	398,000	472,228	512,150	Cartagena ..	75,900	84,000	86,245
Barcelona ..	277,000	272,481	509,589	Cadiz	65 000	62,500	70,177
Valencia.. ..	144,000	171,000	204,769	Jerez	64,500	61,700	60,004
Seville	134,000	143,000	146,205	Palma	58,200	60,500	62,525
Malaga	116,000	134.000	125,579	Lorca	52,900	58,300	59,624
Murcia	91,800	98,500	108,408	Valladolid ..	52,200	62,000	68,746
Zaragoza ..	84,600	92,400	98,188	Cordoba	47,800	55.600	57,313
Granada.. ..	76,000	73,000	75,054	Bilbao	35,200	50,800	74,093

ANNUAL TRADE (*in pounds sterling*).

	1866–70.	1881–85.	1890–94.
Imports	18,128,000	31,244,400	35,088,000
Exports	12,388,000	27,704,000	32,096,000

II.—GIBRALTAR

By Sir R. Lambert Playfair.

Gibraltar.—The celebrated fortress of Gibraltar is situated on a rocky promontory which rises to the height of 1,396 feet. The town is on the west side, the east and south sides are very rugged and almost perpendicular. The northern side, fronting the narrow isthmus or neutral ground connecting it with Spain, is precipitous and difficult of access. The circumference is six miles, the length three miles, and the area 1,266 acres. In ancient times this was Calpe, the European side of the Pillars of Hercules, the African one being Abyla. The rock now bears the name of its Arab conqueror—Jebel Tarik, or

Fig. 202.—*The Strait of Gibraltar.*

hill of Tarik—who landed here in A.D. 711. It was incorporated with the Spanish Crown in 1502, and it was taken by the British during the War of Succession in 1704. Since that time, notwithstanding repeated efforts by Spain and France, and a protracted siege which lasted four years, Great Britain has maintained possession of it at a lavish expenditure. The fortifications have been constantly improved and extended, and it may now be considered as impregnable as defensive works can make any place. The growing importance of Gibraltar as a naval station and as a coaling port has led the Government to lay out a protected harbour with an area of about 450 acres. It was to be enclosed by solid moles, alongside of which the largest battleships could lie. Three large graving docks were to be provided, and the dockyard establishment fitted to undertake every kind of repair. The northern mole was to be reserved for merchant steamers, with facilities for coaling from the very large stocks of coal kept in the stores.

FIG. 203.—*Colonial Badge of Gibraltar.*

III.—PORTUGAL

By Captain Ernesto de Vasconcellos,
Portuguese Royal Navy.

Position and Coasts.—The kingdom of Portugal occupies the most western part of the Iberian peninsula, washed on the south and west by the Atlantic Ocean. The country lies between the parallels 37° and 42° N. and the meridians of 6° and 9° W. Its coast line measures nearly 465 miles, and is formed on the north by hills of moderate height rising inland to mountain ranges. It continues to run southward to a little beyond the Douro, where it begins to change in aspect, becoming less elevated, and is bordered by sand-hills, behind which several mountain ranges appear, looking from the sea like a single chain, of which the Serras da Gralheira, Caramulo, and Bussaco are part, the latter sending out spurs south-westward to near the mouth of the Mondego and ending in the cape of the same name. To fix the sand-hills and prevent the cultivated land in the interior from being invaded by them, the royal pine forests (Pinhal Real) were planted on the coast in the neighbourhood of Leiria, and protect the stretch of coast from the heights of S. Martinho to Vieira beach. Owing to the neighbouring Serras do Bouro, Monte Junto and Cintra, the coast becomes more elevated south of Pedreneira, where it bends towards the south-west. Here the small Peniche peninsula is formed by steep rocks, off which lie the Berlenga Islands. Cape da Roca, the seaward end of the Serra de Cintra, is the most westerly point of Portugal and of continental Europe. Near it the coast forms an ample bay, where the river Tagus has its outlet.

This bay is bounded on the south by Cape Espichel, the extremity of the peninsula between the Tagus and Sado. Beyond this point the coast, formed by the southern slopes of the Serra da Arrabida, recedes eastwards to Setubal bar, where it resumes its southerly trend as a flat and sandy stretch, till the proximity of the Serra de Grandola makes it mountainous once more as far as Cape São Vicente (Cape St. Vincent), the extreme south-westerly point of Europe, where it is broken by some inlets forming natural harbours. Here the coast turns sharply eastwards to the river Guadiana, which separates Portugal from Spain. Near Faro, the most important town of Algarve, the coast is sandy. At some distance from, and running parallel with, the beach, long sandbanks rise above the water.

Configuration.—The general configuration of Portugal can be considered as due to three orographic systems—in the north, the *Transmontano*, or Mountains of Traz-os-Montes (Behind the Mountains), including as its name indicates the mountains situated north of the river Douro, the highest summit of which is Gerez (4,816 feet); in the centre, the *Beirense*, or Mountains of Beira, including the mountains between the rivers Tagus and Douro, the highest of which is Estrella (6,532 feet); in the south, the *Transtagano*, or Alemtejo, which includes all the mountain system south of the Tagus, of which S. Mamede (3,362 feet) is the highest.

The country north of the Tagus is the most mountainous and elevated, whereas south of the Tagus stretch the extensive plains of Alemtejo, principally near Ourique and Beja, and those of Estremadura between the Sorraia tributary of the Tagus and the river Sado, the latter being generally known by the name of Baixas (Lowlands) do Sorraia, near to which are the Lezirias, parts of the interior delta of the Tagus, the soil of which is extremely fertile. Between the northern mountains there are the remarkable plains or Veigas of Chaves and Valença.

Geology.—Almost all the geological formations are to be found in Portugal: granite in the north, in Minho, in a part of Traz-os-Montes, and in the centre of Beira and Alemtejo; porphyry in a part of Alemtejo; basalt in the surroundings of Lisbon; gneiss in the Douro district; mica-schist appears irregularly in different parts; the Palæozoic formations occupy part of the north, the centre, and nearly all the southern region; Mesozoic rocks occur between Aveiro and Lisbon, and Cainozoic in the centre; Jurassic rocks being abundant in Estremadura, where they form several mountain chains and the peninsula of Peniche. Deposits of crystalline limestone form the greater part of Alemtejo.

Rivers.—The principal rivers of Portugal have their origin in Spain. The river Minho, which coming from the Cantabrian Mountains enters Portugal above Melgaço and forms the boundary between the two countries. Its banks are very fertile, and salmon and lamprey are abundant, giving rise to fisheries of considerable importance. The Douro, rising in the Serra d'Urbion, crosses Portugal from east to west. Its bed is cut

between mountains in a narrow tortuous valley, and it receives many tributaries, the most important of which cross the province of Traz-os-Montes from north to south. On the right bank, between the tributaries Tua and Tamega, the Douro irrigates the well-known wine regions, the centre of which is Pezo da Régua, producing the famous wines which being exported from Oporto are known as *Port*. The city of Oporto lies near the mouth of the Douro, on the north bank, and faces Villa Nova de Gaia, the great wine cellar centre.

The Tagus divides Portugal into two nearly equal parts. It rises in the Serra de Albarracim in Spain, and flows south-west to the sea. Between its tributaries, Erjes and Sever, it marks the frontier with Spain. Near Villa Velha de Rodam, the Tagus passes between two high cliffs, which form the celebrated Portas do Rodam, receives the waters of the Ocreza and Zezere, crosses plains of great fertility, to Lisbon, where it widens out to a great basin, called the Mar da Palha (Straw Sea), the eastern estuary by which its waters flow into the ocean, forming in front of the Portuguese capital one of the best and largest harbours in the world. The Guadiana enters Portugal near Elvas, where it is joined by the Caia, runs south, and receives several tributaries, forming the so-called *Raia Molhada* (wet-border). Then it curves slightly to the south-west, running through a deep and rocky bed, till it flows into the ocean, between Villa Real de Santo Antonio and Ayamonte (Spain). Near the Guadiana are the important copper mines of S. Domingos, which are connected by a railway to Pomarão, the most important port of the Guadiana.

FIG. 204.—*The lower Tagus, showing the Mar da Palha.*

The Mondego from the west of the Serra da Estrella flows past the picturesque city of Coimbra, and finds its outlet through marshes and salt-pans at the little port of Figuera de Foz. The little river Sado, one of those with their course entirely in Portugal, runs from south to north in many curves, and when passing Alcacer do Sal widens out through flat banks, where there are celebrated salt-pans, which produce salt of finest quality, exported in large quantities from the port of Setubal at its mouth.

Climate.—Portugal, though not extensive, has a varied climate, due, doubtless, to the great differences of altitude in the country. In the north it is cold and damp. In the district surrounding the Mondego, temperate and damp (Fig. 196). South of the Tagus the hot winds from Africa are felt. Thus north of the Douro the mean annual temperature is 50° F.; between the Tagus and Douro, the mean at Coimbra is nearly 62° F., and in the Guadiana valley it is over 64° F. The mean temperature in Oporto is 59° F.; in the Serra da Estrella only 45°; and in Lisbon 61°. The prevailing

winds blow from the north-north-east, and north-west. The climate on the south coast near the Tagus is very genial in winter.

Resources.—The agricultural resources are great, but, unfortunately, agriculture is not in as high a state of development as could be desired. The staple cereals cultivated are wheat, rye, and maize, the two latter in the north and centre, the former in the south. The vine is grown over the whole country, producing various types of generous and lighter wines. Vegetables and fruit are of the first quality. The oak and chestnut trees are the most abundant in the north, and on the Beira mountains. Pines grow principally on the sea coast, and the olive in Estremadura. In Alemtejo the azinheira and sobreira (cork trees), are important, the cork taken from the bark of the latter constituting one of the riches of the country. In Algarve the fig trees and alfarrobeira (carob tree) are abundant. The fauna and the domestic animals of Portugal are similar to those of Spain. Sardine fishing and preserving are extensive industries on the coast; and the tunny caught along the Algarve coast is also cured and preserved.

The most important mines are those of copper in Alemtejo, and of iron in Moncorvo. Coal is worked in Cape Mondego, and is also found in the neighbourhood of Leiria. Portugal is very rich in mineral waters. Those of Vidago can be compared with the Vichy waters, and the sulphurous waters of Caldas da Rainha, Vizella, and Cucos are also of the best.

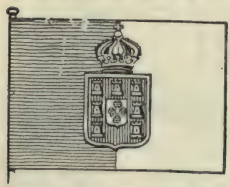

FIG. 205.—*Portuguese Flag.*

People and History.—Owing to insufficient investigation, the origin of the Portuguese people is not as yet fully established; however, Berber influence can be considered as proved, but not the existence on this part of the peninsula of Ligurians and Kelts. History narrates that Turdetans, Turdulos, Suevi, Arabs, etc., passed through at different periods, leaving, as would be natural, ethnic traces. The Portuguese race is of the Aryan stock, and the Latin family. The language is the Lusitanian, derived from the Latin, and is spoken in Portugal, Madeira, Açores, in the Portuguese colonies, and Brazil, and to some extent in Ceylon, Malacca, and other places. The Roman Catholic religion is established by the State, though other religions are tolerated, if without public forms of worship.

The Portuguese became famous through their bold adventurous genius. Inhabiting the sea coast, the constant vision of the broad ocean inspired them to achieve the maritime discoveries of the fifteenth century which astounded the world. Masters of the sea route to India, they destroyed by a clever stroke of political economy the commercial supremacy of Venice. Portugal then reached the height of her glory, which later she lost on Alcacer-Kibir. Spain annexed Portugal in 1580, and only in 1640, by the energy of half a dozen men, did she regain her independence, but her best colonies were lost. The form of government is a constitutional hereditary monarchy.

Industry and Trade.—The Portuguese manufacturing industries, after a long time of decline, have undergone remarkable development since 1890. Factories for woollen, cotton, linen and silk textiles are established in Lisbon, Oporto and other towns, and lace is made in Peniche, Setubal and the Açores. Woollen and cotton goods find good markets in the Portuguese West African Colonies. The manufacture of paper is important, the Almasso paper being a speciality generally used in the country, and greatly appreciated abroad. Glass and china are also largely manufactured. Metals are worked principally in connection with cutlery, all kinds of iron goods, and articles in gold and silver. Oporto filigrees are characteristic and unique. Gold ornaments are greatly prized by the people, who show their wealth by the amount of jewelry they wear on fête days.

Commerce consists, principally, in the export of wines, cork, fresh and tinned fish, copper, and fruit; and the import of cereals, cotton, wool, machinery, iron, coal, and sugar. Most trade is done with the United Kingdom, France, Germany, Brazil, the United States, and Spain. Traffic is carried on principally by means of a main railway line, which connects Faro, the most southern town of Portugal, with Valença do Minho in the extreme north, passing through Lisbon, the centre of the railway system. From this main line others branch off along the valleys of the Tagus and the Douro, and to all the principal towns of Portugal.

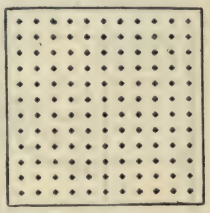

FIG. 206.—*Average population of a square mile of Portugal.*

Political Divisions.—Portugal comprises, besides her colonies, the "adjacent islands" of the Açores and the Madeira Archipelago forming part of the kingdom of Portugal proper. Formerly the administrative division consisted of eight provinces named from north to south Minho, Traz-os-Montes, Douro, Beira Alta, Beira Baixa, Estremadura, Alemtejo, and Algarve; and this division is still generally used. The present administrative divisions are 17 districts, most of which are subdivisions of the provinces, made with regard to equality in the population and wealth of the locality and hence they vary much in size. The districts are divided on the same principle into *concelhos*, or municipalities, and these again subdivided into *freguezias*, or parishes.

Lisbon, the national capital, is built on the right bank of the Tagus; crowned by hills and robed with white buildings, it offers the traveller superb views, not only of the majestic Tagus but also of the surrounding country, covered with plantations and parks, spread over the sides of the encircling hills. In the neighbourhood of Lisbon is the picturesque *Cintra*, loved by Byron, with its castle rising on the mountain crags; *Mafra*, the monumental town renowned for its monastery, seen from the ocean in front of a forest; *Cascaes* and *Estoril* on the coast are two favourite bathing resorts. Estoril is also a first-class winter station, owing to its uniformly mild climate. Lisbon is the seat of the Government and Court,

and also the first commercial port of the country, and the only naval arsenal. *Oporto* is situated on the Douro, where the railway crosses by a monumental bridge. It is an active and important commercial centre, where the most important port wine trade is carried on. Oporto is a lovely city with splendid views, and fine public buildings. *Setubal*, at the mouth of the Sado, is the third port in rank.

The Adjacent Islands.—The *Açores Archipelago* lies between the parallels 37° and 40° N., and the meridians of 25° and 31° W., at a distance of 740 miles from Lisbon. It is made up of three groups of islands: the eastern, comprising S. Miguel (the largest), Santa Maria and the islet of Formigas; the central consisting of Terceira, Graciosa, S. Jorge, Pico, and Fayal; and the western of the two islands, Flores and Corvo (the smallest of the Açores). The most notable mountain peaks are Pico (8,530 feet) and Pico de Vara in S. Miguel, with an altitude of 5,578 feet. In S. Miguel is the curious volcano crater, named *Lagoa das Sete Cidades* (Lake of the Seven Cities), containing four lagoons. The geological constitution of the Açores is volcanic. The climate is mild and temperate. The Açores produce pineapples, oranges, cereals, and wine. Many cattle are kept and the chief industries are the making of butter, cheese, and alcohol. Commerce is carried on principally with the United States, the United Kingdom, and the European Continent. The Açores are divided into three administrative districts: Ponta Delgada, with seven *concelhos;* Angra do Heroismo with five, and Horta with six.

FIG. 207.—*The Açores Archipelago.*

The *Madeira Archipelago*, about 33° N. and 71° W., includes, besides the island of the same name, the Islands of Porto Santo, Desertas, Bujio, and Selvagens. The capital is *Funchal*, which is also the seat of the district government and a stopping-place for passenger steamers between European ports and South Africa. The highest peak in Madeira is Pico Ruivo (6,568 feet), and in Porto Santo, Funcho (1,817 feet). The soil is volcanic. The climate is undoubtedly one of the best in the world, enjoying a universal reputation and much recommended to sufferers from chest complaints. The principal products are wine, superior to sherry, sugar-cane and cereals. There are many cattle. Industry is represented advantageously by articles of inlaid wood, cane (chairs, sofas, baskets), lace, embroideries, and straw hats.

Colonies.—Portugal still stands high amongst the colonial Powers so far as extent of territory is concerned. For centuries the chief European nation holding African territory, Portugal retains the Cape Verde Islands, part of Guinea, the islands of San Thomé and Principe, and the very important territories of Angola in West Africa and Moçambique in East Africa. There are also some less valuable possessions in Asia.

STATISTICS.

	1878.	1890.	1900.
Area of continental Portugal, square miles	34,345	34,345	34,345
Population	4,160,315	4,660,095	5,428,629
Density of population, per square mile	121	135	158
Population of Lisbon (Lisboa)	242,297	301,206	357,000
" Oporto (Porto)	105,838	138,860	172,421
" Braga	19,755	23,089	24,309
" Setubal	14,798	17,581	21,819
" Coimbra	13,369	16,985	18,424
Area of Adjacent Islands, in square miles	(?)926	(?)926	(?)926
Population	390,384	389,634	407,002
Density of population, per square mile	(?)421	(?)420	439
Population of Funchal	19,752	18,778	(?)22,000
" Ponta Delgada	17,635	16,767	17,675

ANNUAL TRADE (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	6,875,000	8,040,000	8,875,000
Exports	5,142,000	5,100,000	7,625,000

PORTUGUESE COLONIES IN 1896.

	Area in sq. miles.	Population.
Cape Verde Islands	1,480	114,000
Portuguese Guinea and Islands	4,800	845,000
Angola	484,800	4,119,000
Portuguese East Africa	301,000	3,120,000
Portuguese Possessions in India	1,560	572,000
Timor, Macao, &c.	7,460	379,000
Total Portuguese Possessions	801,100	9,217,000

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CHAPTER XXII.—THE RUSSIAN EMPIRE

By D. Aïtoff.[1]

I.—GENERAL

The Russian Empire in General.—Upon a terrestrial globe the Russian Empire appears in the form of a rectangle twice as long as it is broad (Fig. 208). Two sides are washed by the sea, the Baltic with its three gulfs, the Arctic Sea on the north, and the Pacific Ocean on the east. The southern side is marked by mountains and steppes, the Turkoman Steppe, Alai-tagh, Tian Shan, Tarbagatai, Sailugem, Sayan, Yablonovyi Khrebet, Khingan, Sikhota-alin. The fourth side is open towards Europe, and is bounded by arbitrary lines which, for a certain distance, follow the slopes of the Carpathians, separating Russia from the Austro-Hungarian Monarchy ; but further to the north a purely artificial frontier winds across the northern plain of Europe. Within these limits the Russian Empire occupies in one continuous expanse one-twenty-second part of the surface of the Earth, or one-sixth of the land of the globe.

Fig. 208.—*The Russian Empire from a globe.*

In Russia, more than other parts of the globe, the geographical and historical evolution of the country has been guided by the configuration of the land. The plain which stretches from the western confines of the empire to the Pacific presents no physical obstacle in any part to the expansion of Russia. In past ages it has served as the route for the nomadic peoples who descended from the high plateaux of Asia and swept onwards to conquer Europe or to dwell in its unoccupied territories. Later, the Slavs who settled in what is now Russia formed a bulwark to western Europe, and stopped the invasions of the Asiatic hordes which made their homes in the south of the country. The Mongols, having made themselves masters of all the Slavonic principalities, served as a sort of cement to bind together these disunited States, and thus helped forward the formation of a country which two centuries later became strong enough to drive them out. For several subsequent centuries the Russian plain was the theatre of the wars of the Muscovite State, by which the Asiatic hordes were conquered and the dying power

[1] Translated from the French by the Editor.

of Poland extinguished. Finally, it was in the Russian plain and not in Brabant that the empire of Napoleon was shattered.

While most of the rivers of Europe take their rise in the mountains, the largest streams of European Russia have their source in the moderate elevation of the Valdai hills, the height of which scarcely exceeds 1,000 feet. From this region the rivers flow to the Baltic, the Arctic Sea, the Black Sea, and the Caspian. By a singular and happy chance the rivers which traverse the Russian plain spread through the country like the arterial or venous system of an organised body. The Volga, the Dnieper, the Duna, and the Niemen rise close together and diverge to the furthest limits of the country ; and some rivers such as the Don and the Volga, born in distant regions, approach until they almost touch and, although no apparent obstacle prevents their meeting, separate again to fall into different seas. Again. the Dnieper, the Bug, and the Dniester, coming from distant sources, converge to what may be termed a single estuary.

The Russian plain, no part of which exceeds 1,150 feet in height, naturally forms a single climatic region ; atmospheric disturbance can be propagated over the surface without encountering any obstacles from the border of the White Sea to that of the Black, and from the plains of Bessarabia to those of the Pechora. The winds which blow from the Arctic Sea reach unchecked the borders of the Euxine, and conversely the influence of the southern breezes is felt along the slopes of the Ural and upon the shores of the Polar waters. It is true that the mean temperature varies very considerably from north to south ; in some parts of the north it is even colder in summer than it is in winter in more favoured spots ; but the transition between the various climates is so gentle as to be imperceptible.

The Russian Empire and the Russian People.—It was in this plain, and at first in the very region where its great rivers rise, that the Muscovite kingdom had its origin, grew, and strengthened until it became the Russian Empire, which originally an Asiatic power in Europe is now a European power in Asia. The dominant character of the region which has given birth to Russia is monotony : one land, one climate, one flora, one fauna, one race. In its growth the Russian Empire has come in contact with countries of an entirely different type, and has incorporated them so that now it possesses every variety of surface and scenery. Like Palestine with the Dead Sea, Holland with its polders, and the United States with Death Valley, Russia contains an area of depression, that of the Caspian, larger than all the other sunk plains in the world put together. While the mountain chain of the Tian Shan must cede the supremacy to the Himalayas and the Andes, yet the peak of Khan Tengri exceeds 24,000 feet, an altitude equal to that of the culminating summit of the Carpathians added to the giant of the Alps. Even at the doors of Europe, Elbruz, Kazbek, and several other summits of the Caucasus exceed 16,500 feet. In the south, steppes more extensive than all the savannas and prairies of America ; in

the north, vast tundras, on which the hold of frost never relaxes ; in the north-west, a lake region, smaller indeed than those of America or of Africa, but yet of great size ; here a region of black earth of extraordinary fertility, there solitudes greater and less known than those of the far west of America or the centre of Australia ; finally, from the Crimea to Kamchatka a belt of wild and picturesque mountain chains. Such are the varieties of land and scenery within the Russian Empire. Striking as these diversities are, they are paralleled by those of the inhabitants of the empire. Just as the central plain is surrounded by regions of the greatest variety, so the people of the Great Russian branch of the Slav race are surrounded by a number of races incomparably greater than in any other country of the world. These include Slavs of the Polish branch, Jews, Tatars, more than thirty different races in the Caucasus alone, Kalmuks, Turkomans, Tunguses, Yakuts, Koryaks, Samoyeds, Ostyaks, Voguls, Finns, and many others. From the point of view of religion, beside the great body of members of the Orthodox Greek Church, there live believers in all creeds and in none—Freethinkers, various sectaries of the Greek Church, Protestants, Roman Catholics, Moslems, followers of the Jewish persuasion, who are not all Semites, Buddhists, Brahmanists, and Fetish worshippers, or simple Pagans. Russia is no less varied when considered from the moral and intellectual standpoint. Side by side with the absolutism of the Government is the independent spirit of the moral leaders of Russian society ; custom has an almost Asiatic power, yet there is an entire want of tradition ; obligatory membership of the all-powerful Orthodox Church is confronted with the utter Atheism of the intellectual and with hundreds of different sects, some ritualistic, some rationalistic : such is "the Russian people."

Natural Divisions of the Russian Empire.—The central nucleus of European Russia is a slightly undulated plain rising to a moderate elevation somewhat to the north-west of its geometrical centre, and giving rise to all the great rivers of the country. It is the river system which distinguishes this plain from all others. In the north-west the *Lake Region* is unique in the complex mingling of land and water. In the south-west there is a region very distinct in its natural characteristics, but without a special name ; it might be termed Transdnieperia (from the Russian point of view), or *Carpathia*. In the south, separated from the Russian plain by lowlands or even sunk plains, comes the great chain of the *Caucasus*, with its western prolongation, the *Crimea*, and its eastern termination in the highlands of *Transcaspia*. In Asia two varieties of steppe are to be distinguished, the high and the low, the latter sometimes sinking below the level of the sea, the former rising to elevations of many thousand feet ; but both presenting the same characteristics of land surface, climate, flora, and fauna. The vast territory of *Siberia* sloping wholly towards the north, furrowed by its immense but useless rivers and with a rigorous climate, supports upon an area greater than all Europe no more inhabitants than

dwell in the single town of London. The last of the varied natural divisions of the Russian Empire is the mountainous land of the *Transbaikal Province* and the *Pacific slope*. Each of these regions is remarkable for the unity of its geographical features, and each will be described in the order given above without special reference to administrative subdivisions, the boundaries of which have no relations to natural features.

II.—CONFIGURATION

Central Russia.—The natural region of Central Russia is bounded on the north-west by the Lake Region; on the west its limit is the depression which runs from the Black Sea to the mouth of the Oder by the valleys of the Dnieper and the Pripet and the plains of the Vistula; on the south it is bordered by the low steppes and the depressions which mark off the Caucasus; and on the east by the steppes between the Volga and Ural, the Obshchii Syrt, and the chain of the Ural, while further north it merges without a break into European Siberia.

FIG. 209.—*Central Russia—Area above 600 feet in elevation shown in black.*

A gentle elevation of the surface defined by the contour line of 170 metres (say 600 feet) extends from the bend of the Mologa in 58° N. in a south-south-easterly direction to Kharkov in 50° N. It culminates in the Valdai hills at an elevation of 1,150 feet. A second smaller "island" of high ground extends from north to south along the right bank of the Volga from Kazan in 56° N. to Kamyshin in 50° N. A third and smaller "island" of the same elevation lies to the south of the Donets, a tributary of the Don. If we consider the central mass of Russia as bounded by a lower contour line (that of 425 feet), a western projection will be observed occupying the whole space between the Pripet on the south, the Duna on the north, and the meridian of Dvinsk on the west. The top of the entire region in which the principal rivers rise is a land of swamps, and appears to be an almost dead level. All the great rivers of Central Russia have arrived at a state of mature adjustment to the land, having drained their ancient lakes and established their individuality as river systems. They carry an enormous volume of water, although com-

pared with its area, Russia is traversed by a much smaller volume of running water than western Europe.

The Volga.—The *Volga* is the first of Russian rivers; it is the longest and has the largest volume of water in all Europe. Rising in a peat moss the little stream flows through a series of lakes, and on leaving Lake Volgo it is a considerable river with a volume of from 110 to 1,320 cubic feet per second, according to the season. Its first important tributary is the Selizharovka, which flows from the lake of Seliger, and at the confluence of these two rivers, which are of almost equal volume, the true course of the Volga may be said to commence. The tributaries on the left bank flow from the low watersheds which separate the Volga from the river systems of the Baltic and the White Seas. At Nizhnii-Novgorod it unites with the Oka, a river of equal size, but much greater historical importance. The Oka was long the frontier between the Tatars and the Slavs, and it flows through the very centre of the European Russia of to-day; from its source in the Black Earth region it waters the most fertile part of Great Russia along a course of 970 miles, and where it enters the Volga it is almost a mile in width. About 60 miles below the point where the Volga turns to a southerly direction, it receives on the left bank the Kama, which brings in the drainage of a region larger than the United Kingdom. The Kama and the Volga are nearly equal in volume, but the water has a different colour, that of the upper Volga being grey, and of the Kama yellow. The united river flows on in the direction of the great tributary as far as Simbirsk, where the volume of the stream is as great as it is at its mouth. Below Simbirsk the Volga closely follows the base of a calcareous plateau which causes it to make a sharp bend at Samara. In its lower course the great river divides into several branches, the most westerly of which retains the name of Volga and the most easterly is called Akhtuba. Between Simbirsk and Samara the banks of the Volga are very picturesque, the hills of the right bank rising abruptly for more than 300 feet above the water, present indeed an almost mountainous appearance. The Belyi Klyuch, south-west of Syzran, rises to 1,100 feet above the average level of the river, and other summits reach 600 or 800 feet, forming imposing heights compared with the almost imperceptible swellings which ripple the surface of Central Russia. The uniform low level plain which lines the left bank presents the most striking contrast.

The Western Rivers of Central Russia.—While the Volga is the greatest of Russian rivers, the "Mother Volga" of the Great Russians, the *Dnieper* in its own region is no less honoured; the Little Russians call it "Father Dnieper." It rises only 50 miles from the source of the Volga, and although shorter (1,330 miles), its drainage area is as large as France. The Dnieper receives few tributaries in its upper course as far as Smolensk and Mohilev, but below Rogachev it receives successively three great tributaries, the Berezina, the Pripet, which traverses a region of swamps, now in large measure drained and converted into meadows, and the Desna.

Below the confluence of the Desna the left bank of the Dnieper is everywhere low, while the right bank rises in cliffs to the height of 300 and 400 feet; and the course of the stream is obstructed by rapids (*poroghi*), which were mentioned by the early Byzantine chroniclers.

The third river which flows from the central plateau is the *Duna*, or Western Dvina, which is the great river of the White Russians and Lithuanians. Originating as the outflow of Lake Okhvat, only 12 miles from Lake Volgo, the Duna flows to the south-west as far as Vitebsk, and then, turning at right angles, it flows north-westwards to its mouth in the Gulf of Riga. It has no tributaries of any importance, and its banks are low and marshy. The Velikaya, the Lovat, and the Msta belong by their mouths to the Lake Region, and the Sukhona, the main branch of the Northern Dvina, will be described in the section on Siberia.

The *Vistula* is essentially a Polish river. It enters Russia as a considerable stream, navigable by large vessels from the confluence of the San, and leaves it as a majestic river carrying a volume of at least 8,000 cubic feet per second to the Baltic. It receives no tributaries beyond the frontier, its most important affluents being the united Bug and Narev.

The *Don* and its upper tributaries rise in the central swelling of the Russian plain, which also gives origin to the Volga, the Dnieper, and the Duna. It is one of the largest rivers in Europe, having a breadth in some places of 18 miles during the spring floods, although the droughts of summer reduce its volume to such a degree that navigation is very difficult even for light-draught vessels on account of the shallowness of the channels and the number of sand-banks; some of the tributaries dry up completely. The largest tributary is the Little Don, or *Donets*, which was navigable down to the seventeenth century, but has since been reduced in volume on account of the destruction of the forests which covered vast areas of southern Russia. Now navigation is possible only in the lower course of the river when it is in flood. The basin of the Donets is commercially important on account of its coal-mines, which are worked here and there over an area of 9,000 square miles.

South-Western Russia.—This region, which we suggest might be named *Carpathia*, extends on the north to the low plains of the Vistula and Pripet, on the east to the valley of the Dnieper, while on the west it is prolonged into Austria-Hungary and Rumania as far as and beyond the Carpathians and the Transylvanian Alps. Elisée Reclus says of it: "From the geological point of view the depression which joins the Black Sea and the Baltic through the valleys of the Dnieper and the Oder separates two different worlds; on each side everything is unlike: the outline of the contours, relief of the land-forms, and the folding of the strata. On the west [the author should have said on the south] the land is the result of frequent and complicated geological changes; on the east it bears the impress of slow and regular oscillations." The culminating point of this district, cut up here and there into superb escarpments and beautifully diversified by

forests, is in Poland, where the St. Catherine beacon on the Bald Mountain (*Lysa Gora*) reaches a height of 2,003 feet; and in Russian territory the Castle of Kremenets reaches 1,309 feet. The rivers of this region are the Bug, the Dniester, and the Pruth, a tributary of the Danube. The *Dniester* is the largest, rising in the forest region and crossing the land of the black earth and the bare steppes to the south of it; and although it is one of the most tortuous rivers on the surface of the Earth its bed is very deeply cut into the strata across which it flows.

The Lake Region.—The region of the northern lakes includes Finland and the Russian governments of Olonets, Novgorod, St. Petersburg, and Pskov. The fact that the government of Novgorod alone contains 3,200 separate lakes and that of Olonets 2,000, is sufficient justification for the name. The parts not occupied by sheets of water or by marshes consist of isthmuses and peninsulas; the lakes, as a rule, communicate with one another. The highest part of this region is in the north, where some summits exceed 3,000 feet. Southern Finland and the Russian part of the region contain no mountainous elevations, the highest hills being rounded knolls worn by the action of the ancient ice-sheet. No other part of Europe abounds in erratic blocks to such an extent as Finland, and many of these are so large that the peasants build houses in their shelter. The ancient glaciers have left the marks of their passage deeply engraved on the surface of the land, and the general forms of the country are everywhere due to glaciation. There are few better marked land surface features in the world than the parallel valleys which descend to the Gulf of Bothnia, both on the Finnish and Swedish sides, and the same phenomenon occurs in the interior. In many parts of the country the general alignment is of almost geometrical regularity; hills, lakes, marshes, and chains of boulders running parallel to one another from north-west to south-east; and all public works, embankments, cuttings, lines of communication, even the streets of villages and of towns have necessarily to follow the same direction. The whole of Finland is sprinkled with lakes, lagoons, and marshes; the lakes, indeed, forming such a labyrinth that it is impossible, without paying the most minute attention, to trace the watersheds separating the drainage areas of the Gulfs of Bothnia and Finland and of Lake Ladoga, the zone of separation being frequently a tract of almost level marsh. Amongst the more important lakes of Finland may be mentioned the little-known Enere, Saima, which has been united by canal since 1856 with the Gulf of Finland, and Päijänne, which empties by the Kymmene Elf into the same gulf. The rivers which unite the lakes sometimes spread out to a wide expanse and sometimes form rapids, the most celebrated of which is the grand cataract of Imatra in a granite gorge which interrupts the course of the Vuoxen.

The Larger Lakes.—The Russian portion of the Lake Region includes 15,500 square miles of water surface. *Lake Ladoga* is the chief and still the largest lake in European Russia, and fifth in size in all the

Empire, ranking next to the Caspian, Aral, Baikal and Balkhash. In former times its dimensions were much greater, for it formed one basin with the Gulf of Finland. From the low southern shore, an almost treeless, boulder-strewn region of glacial origin, the lake bed descends by a gentle slope towards the depths whence rise the granite cliffs of its northern coast. The average depth is estimated at almost 300 feet (50 fathoms), which gives a total volume of water nineteen times as great as that of the Lake of Geneva. The water is, as a rule, very clear and remains cold at all seasons ; even in August the surface temperature scarcely exceeds 54° F., and in May it is only 36°. Lake Ladoga is frozen over for about 120 days in the year, from December to April. Near Valaam Island masses of ice have been measured piled up to a height of 75 feet, and presenting from a distance the appearance of hills of weathered schist. The gales which frequently blow over this lake raise high and confused waves followed by a heavy ground swell. Notwithstanding the freezing of the lake its animal life is very abundant, including not only fish, but a species of seal which may be seen in winter on the edge of the ice cracks. The river Neva, flowing from the lake into the Gulf of Finland, has a length of 43 miles, and carries a volume of water equal to that of the Rhone and Rhine united. *Lake Onega* is for the most part very deep, and near the centre soundings of 740 feet (120 fathoms) have been obtained. The northern side of the lake forms numerous bays running towards the north-west, and prolonged towards Lapland by chains of small lakes and by rivers following the same direction and separated by lines of hills between 800 and 1,000 feet in height ; these features running parallel to those already noted in Finland. Lake Onega communicates with the White Sea by a series of lakes and rivers, and with the Gulf of Finland by the river Svir, which flows into Lake Ladoga. Its tributary, the Vitegra, brings it into connection with the Volga system on one side, and with the Mezen on the other. *Lake Ilmen* is really nothing more than a permanent inundation formed by a number of rivers which meet at a point whence the outlet is not large enough to carry off the whole of the water ; its depth does not exceed 30 feet, and the waters are almost always muddy. The Volkhov, which carries off the overflow of the lake, is the chief affluent of Lake Ladoga, and is a muddy river throughout its whole length. The streams which meet in Lake Ilmen are the Shelon, Lovat, and the Msta, which places it in communication with the Volga. *Lake Peipus*, the southern branch of which is called the Lake of Pskov, has a north-north-west and south-south-east direction, like Ladoga and Onega. Its average depth is some 30 feet and at the deepest point it only reaches 90 feet, yet it remains frozen for a shorter time than the other Russian lakes. It receives the Velikaya and the Embakh, which places it in connection with the Gulf of Riga, and its own outlet is by the Narova to the Gulf of Finland.

The Crimea.—The Crimea, which we consider as a prolongation of the Caucasus, is placed entirely outside Russia by its geological structure.

The southern slope of the Yaila Tagh is for the Russians a second Italy as far as climate, vegetation, and the appearance of earth and sky can make it so. "Like the Caucasus," says Elisée Reclus, "the Crimea is one of those districts which has contributed most to develop the love of nature in the modern Russians." The mountain chain which extends along the south-east of the Crimea is little more than 100 miles in length, and its culminating point has an elevation of 5,060 feet. Although a hundred feet lower, the best known of its summits is the Chatyr Dagh, which may be taken as an example of a land-form common in this district, a limestone wall cut into battlements, which from a distance presents the appearance of a giant tent. There are few rivers in the Crimea, the largest of them being the Salgir.

The Caucasus.—As a mountain chain the Caucasus is remarkable for the unity of its geographical features and its general orientation, the chain running direct from south-east to north-west with only the smallest deviations. Each end of the chain forms a peninsula, that of Apsheron in the Caspian on the east, and that of Taman in the Black Sea on the west. The latter is only separated from the peninsula which forms the eastern termination of the Crimean range by the narrow Strait of Kerch. The peninsula of Apsheron is continued across the Caspian by a series of volcanic islands and then by a submarine ridge, and beyond that sea it runs eastward as a chain of heights, either mountains, hills, rocks, or the scarped edges of plateaux, as far as the valley of the Murghab between Merv and Herat. The range of the Caucasus is 750 miles in length, and is divided almost exactly half-way between the two seas into two unequal parts by a depression through which the great military road passes in the Darial defile. At this point the range is only 60 miles wide between the northern and the southern plains, while the western Caucasus is twice and the eastern two and a half times as wide as the constricted portion which divides them. The western Caucasus contains the highest summits; Elbruz, Koshtantau, Dikhtau, and two other peaks surpassing the altitude of Mont Blanc. The eastern Caucasus is lower than the western, but less uniform, more varied in outline, and the spurs which ramify from the central ridge in various directions give rise to a labyrinth of valleys. The general relief of the Caucasus is formed almost throughout by two, and in some places by three or four, ranges running parallel to one another, or only slightly diverging, and connected here and there by knots. The main chain may be considered to be that which forms the watershed, although in several parts of the system it is not the most elevated, Mount Elbruz, for instance, rises to the north of it. From the orographic point of view the loftiest summit of the Caucasus is Koshtantau, which rises on the watershed, and is the highest granitic mountain of the range. As a rule the southern slope of the Caucasian ranges is much more abrupt than the northern. The regularity of structure is as apparent in the great geological features as in the general relief, at least upon the northern side. The main

chain is composed throughout of crystalline schists resting here and there on granite, and diminishing in extent from west to east. On both sides of the central chain the slopes consist mainly of calcareous and silicious strata of different ages, Jurassic, Cretaceous, and Eocene; to the north these rocks dip under the Pliocene and Recent formations of the steppe. Near the middle of the chain, where it is constricted, the high valley of the Terek forms a sort of geological gulf in which a great horizontal plateau of Tertiary sandstone advances like a peninsula in the midst of the Cretaceous strata. Elbruz, the highest summit of the Caucasus, is an ancient volcano, and Kazbek is also a trachytic cone. Thermal springs are exceedingly abundant. The peaks of the Caucasus, although higher on the whole than those of the Alps, are not so heavily enfolded in snow and ice. This is due not only to their more southern latitude and other climatic conditions, but also to the narrowness of the high ridges and the absence of corries in which the snow could accumulate in extensive nevés. The snow line varies much in its position; on the western flanks of Garibalo it comes down to 8,300 feet, while on the north-west of Great Ararat it reaches only to 14,300, and Alagœz, 13,500 feet in height, is entirely free from snow in summer. The average height of the snow-line is about 2,000 feet higher in the Caucasus than in the Pyrenees which occupy the same latitude.

The plateau of Armenia, separated from the Caucasus by the narrow furrow in which the Rion and the Kura flow, is only partly in Russia, and may be better described in the general account of Asia. Its highest summit is Mount Ararat, where three empires, Russia, Turkey, and Persia, meet.

The Kuban is the chief river of the Caucasus, with a length of 550 miles, and next to it rank the Kuma, the Terek, and the Manych. They have all a very variable volume; in spring and in autumn they are swollen by the melting of the snow or the fall of rain, and consequently inundate the low grounds, but in summer they shrink enormously after leaving the mountains, partly on account of evaporation and partly because of the quantity of water diverted from them for purposes of irrigation. The Kuma terminates in the midst of a reedy swamp sixty miles from the Caspian. On the south of the Caucasus the Ingur, Rion, and Chorokh flow to the Black Sea, while the Caspian receives the Kura (830 miles), with its scarcely less important tributary the Araxes (640 miles).

The Aralo-Caspian Basin.—There is no general name for the region which lies between the Caspian on the west, the plateaux of Persia and Afghanistan on the south, and the Pamirs on the east, stretching to the Tian Shan and the Tarbagatai on the north-east, to Siberia on the north, and merging on the north-west into the steppes which lie between the Ural and the Caspian. The three provinces of Syr-daria, Samarcand, and Ferghana bear the name of *Turkestan*. The northern part of the region, from an administrative point of view, forms the General Government of the Steppes, and the country between the Amu-daria and the

Caspian is termed the Transcaspian district. The whole region is made up in almost equal parts of highlands and lowlands; on one side mountains rise to heights of from 20,000 to 23,000 feet, while on the other side the surface sinks to the Caspian 85 feet below the level of the sea. Notwithstanding this diversity the region presents a remarkable unity, especially with regard to climate. In July the temperature ranges between 68° and 77° F. on the average, the temperature of the Cape Verde Islands; but in January the average is from 5° to 23° F., the same as in the heart of Canada, in southern Greenland, or in Spitsbergen. The range of extreme temperature is no less than 133°, from 111° F. to —22°. Another general characteristic is the progressive dessication of the country. The Syr-daria and the Amu-daria were formerly of much larger volume and probably united in one stream which flowed to the Caspian. The great lakes, such as Lake Balkhash and Lake Aral, have shrunk in their dimensions, those on the high plateau have been partly emptied like Issyk-kul, and others have completely disappeared. In consequence of this dessication a large part of the country, in the mountains as well as on the plains, has assumed the character of the steppes. On the Pamirs, in the Tian Shan and the Tarbagatai, every longitudinal valley and every hollow is a steppe, with vegetation singularly restricted both as to number of species and the annual period of growth which is limited to three months in the year.

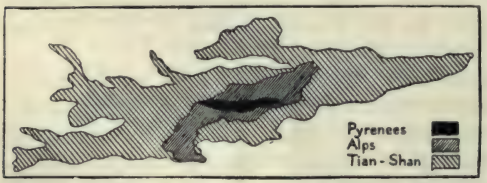

FIG. 210.—*Relative areas of the Tian Shan, Alps and Pyrenees—after Reclus.*

The Tian Shan, the Alai-tagh, the Alai, and the Trans-Alai, are the principal mountain chains of Turkestan, the two latter being the ramparts of the Pamirs, which completely separate the two parts of Asia. The vastness of the Tian Shan is clearly shown by the accompanying figure adapted from the "Géographie Universelle" of Elisée Reclus. It includes steppes, deserts, half-dried lakes, and salt marshes. The Pamirs, which form the meeting-place of the three great empires of Asia, are described in the general account of that continent.

The Steppes.—The steppes which extend through the whole of Turkestan and across the river Ural into the interior of Russia form a vast, naked land, except during a few weeks of spring and summer, when they are clothed as if by enchantment with verdure and flowers. Deserts, properly so called, extend over half of the plain of Turkestan between the watershed of the Ob and the plateau of Iran; the most famous is the *Bek-Pak-Dala*, or Hunger steppe. The whole country is sprinkled with lakes, with funnel-shaped hollows, and salt marshes side by side with lagoons and lakes of fresh water. Of the numerous rivers which formerly emptied into Lake Aral two alone now reach it. The *Syr-daria* (the

Jaxartes of ancient authors and the Seihun of the Arabs) rises in the heart of the Tian Shan. As it flows across the steppe the great river diminishes in volume more and more, on account of the abstraction of its water by irrigation canals which change a great part of the barren plain into smiling gardens. Between the Syr-daria and the Kara-daria the whole country is cultivated, shaded by trees, and musical with running water ; it is the most fertile part of Turkestan. Sandy districts lacking the water necessary to fertilise them form little deserts here and there, and a zone of sterile and uninhabited country stretches along the right bank of the river. The most important of the streams which flow towards the Syr-daria, but dry up without reaching it, is the Chu.

The *Amu-daria* (the Oxus of the ancients and the Jihun of the Arabs), more than 1,550 miles in length, is formed by two rivers, the Aksu, which is probably the more important, and another issuing from Lake Victoria on the Pamirs, which was discovered by Wood in 1838. The Surghab, fed by the snows of the Trans-Alai, joins the river lower down ; beyond that the Oxus escaping from the gorges of the outer heights of the Pamirs only receives tributaries of minor importance. Below the tributaries flowing from western Badakhshan it does not receive another drop of water from the south ; all those rivers, including the Zarafshan, which would naturally have flowed to it, are either diverted for irrigation or are drunk up by the insatiable sands of the desert. The Murghab, which was formerly a tributary of the Amu-daria, is now exhausted in forming the oasis of Merv long before it reaches the great river. The changes which the course of the Oxus have undergone during the historic period, are among the most extraordinary phenomena of physical geography. During the first half of the sixteenth century it was one of the feeders of the Caspian ; this was indeed only a temporary phenomenon, for since the period of the Greek historians it has twice been turned from the Caspian to Lake Aral. In Strabo's time the Oxus, "the largest river of all Asia, with the exception of those of India," fell into the Caspian Sea ; but on the map of Idrisi, the Seihun and the Jihun flowed together into Lake Aral.[1]

Very few rivers flow into the Caspian on the Asiatic side. The largest of them is the *Ural*, which is usually considered as the boundary between Europe and Asia. It is long, but narrow, and of small depth ; its only importance lies in the very considerable fisheries between Uralsk and the mouth. The largest lake of the region is usually termed the Aral *Sea ;* it has an area of more than 23,000 square miles, and is filled with very salt water. The next in order of size is Lake Balkhash, which extends for 340 miles from west to east. Both lakes are very shallow and, like all the sheets of water in this region, are diminishing in extent.

Siberia.—Siberia forms a plain far more extensive than that of European Russia. Its special character is the regular slope of its surface

[1] See the author's reduction of the 70 maps of Idrisi's Geography in Schrader's *Historical Atlas.* Paris, Hachette.

from south to north, as is indicated by the direction of all the Siberian rivers. The Tian Shan, Alatau, Tarbagatai, Altai, Sayan mountains, Apple Tree (Yablonovyi) chain, and the Dorsal (Stanovoi) chain separate it on the south and south-east from Mongolia and the Pacific slope. The nature of the land divides Siberia into two parts : Western Siberia, which includes the north of Russia in Europe from which the extremity of the Ural range scarcely separates it, and Eastern Siberia. West of the Yenisei the country is low, covered with rich soil or sheets of water, marshes, and trembling meadows. The watershed between the Ob and the Yenisei, for instance, is so imperceptible that according to the direction of the wind the water of the marshes which compose it flows out sometimes to one river, sometimes to the other. The steppe of Baraba, between Omsk and Tomsk, is as flat as the surface of a lake, and the soil is formed of sand so fine that the inhabitants have no idea what a stone is like. Between the Tobol and the Ob the country is one huge marsh, impassable in summer except along the margins of the rivers which drain off the superfluous moisture of the land in their immediate neighbourhood. The only mountain chain of any importance west of the Yenisei is the Ural, which runs from north to south along the meridian of 60° E. for 1,500 miles, with a breadth varying from 1¼ to 100 miles. It is built up throughout of crystalline rocks covered by regularly disposed strata and contrasting with the uniformity of the neighbouring plains. In the north and in the south the Ural mountains rise to 5,300 feet, but in the centre their elevation is so slight that one crosses the chain between Perm and Yekaterinburg without seeing more than some gently rounded and hardly recognisable eminences. In spite of its northern situation the Ural has no glaciers, the snow-fall being insufficient, on account of the dryness of the air, to produce permanent snow fields. It is only in some of the deep ravines with a northern exposure that any snow remains unmelted during summer. East of the Yenisei the land is diversified and stony, with outcrops of solid rock appearing here and there, and it even rises into groups of hills which are difficult of access. Mount Makachinga, the highest summit north of the Arctic circle, reaches a height of 8,500 feet.

Pacific Slope.—The mountains which traverse Asiatic Russia from south-west to north-east are divided into a series of highlands, plateaux, and chains. From the Tian Shan to the Sayan these mountains form the boundary between the Russian and Chinese empires ; further east, where the Russian frontier runs furthest to the north, the highlands, of an average altitude of from 6,500 to 10,000 feet, constitute the border chain of the great inclined plain of Siberia. From the high plateau of Transbaikalia, bounded on the south-west by the Khamar-Daban and the Sokhondo, 9,200 feet high, the Apple Tree chain (*Yablonovyi Khrebet*) branches towards the north-east but contains no summits of an equal height. From the shores of the Sea of Okhotsk the whole eastern region is very diversified, and the forms of the land are most abrupt in the neighbourhood of the sea. The edge of the Siberian high plain, to which the land rises imperceptibly from the north-

west, is sharply scarped when seen from the Pacific side, and bears the name of the Backbone or Dorsal chain (*Stanovoi Khrebet*) which Middendorff proposed to call *Stanovoi Vodorazdel* or Main Divide. This edge, which is improperly represented on maps in the form of a mountain chain, is really composed of heights, hills, mountains, or plateaux, still little known, and winding from the Transbaikal plateaux to Cape Dezhneff (East Cape), a distance of 2,500 miles.

The island of Sakhalin, separated from the mainland by the strait known as the Gulf of Tartary, resembles the neighbouring coast of Russian Manchuria in its configuration. The mountain chain which borders the west coast rises here and there into real peaks of from 3,000 to 5,000 feet in height.

Finally, the mountains of Kamchatka, although attached to the Stanovoi Khrebet, differ from it completely. They are the highest, after the giants of the Tian Shan, and are the only mountains in Russian territory which continue volcanically active. The highest of the many volcanoes of the peninsula is Mount Klyuchev, which attains to within a few feet of the height of Mont Blanc. Most of the volcanoes of Kamchatka, ten of which are in full activity, are ranged in a single row along the east coast. Although smoking continually and sometimes glowing with molten lava, these mountains stand clothed in eternal snow and covered with glaciers.

The great Khingan and the Sikhota-Alin, running from south-west to north-east, are two ranges distinct from the other mountains of Asiatic Russia.

Rivers of the Arctic and Pacific Slopes.—The rivers of Siberia are amongst the largest in the world. If we only suppose that half of the annual precipitation is carried by them to the sea, the volume of the Ob and of the Yenisei must in each case exceed 110,000 cubic feet per second, or more than four times that of the Rhone and the Rhine, but they vary greatly throughout the year. In winter the frozen surface retards the movement of the deeper water, and the small streams are completely stopped. The largest rivers of Siberia and the north of European Russia are, in Europe, the Northern Dvina and the Pechora, and in Asia, going from west to east, the Ob with the Irtysh, the Yenisei, the Lena, the Amur, and a dozen other streams which would elsewhere be considered great rivers, but appear insignificant in comparison with those which have been named.

At the junction of its two main branches, the Sukhona with the Yug and the Vychegda, the breadth of the *Northern Dvina* is more than two-thirds of a mile; further down, after receiving the Vaga and the Pinega, it spreads over a space which varies from two to four miles in breadth from bank to bank, and its delta on the White Sea has an area of 440 square miles. The *Pechora* and its principal tributaries rise on the slopes of the Ural mountains, and the river is larger in every way than the Dvina; its delta on the Arctic Sea having a length of 125 miles.

The *Ob* and its tributaries drain an area almost equal to that of western Europe (1¼ million square miles). Judged by length and directness of

course, the Irtysh and not the Ob is the main river of this system. It rises in Mongolia, where at first it bears the name of Urungu and later Ulyungur, and it is only where it leaves Lake Zaisan that it receives the name of Irtysh, which it bears to 60° N. The Ob and the Irtysh are navigable throughout almost their whole length ; in summer all the large tributaries and, during the spring floods, several of the second rank admit of the passage of barges and light-draught steamers ; the whole navigable distance of the Ob and its tributaries together exceeds 9,000 miles. At its mouth, on the Kara Sea, the Ob is more than five miles wide and has a depth of from five to fifteen fathoms.

The *Yenisei*, like the Ob, is shorter than its chief tributary, which rises in Mongolia where its principal branch is called the Selenga ; it flows into Lake Baikal, whence it escapes under the name of the Upper Tunguska or Angara. The Yenisei itself is formed by the junction of the Ulu-Kem and the Bei-Kem in a corry of the mountain range which continues the Sayan range on the east, then after escaping from its high mountain basin by a succession of defiles cutting across the parallel ridges of the Sayan, it flows straight northward to the Arctic Sea. The chief tributaries of the Yenisei come from the east. The most northern of these is the Lower Tunguska, which places the basin of the Yenisei in communication with that of the Lena. The tributaries on the left bank, all of which are comparatively short and insignificant, give access to the basin of the Ob. The Yenisei enters the Arctic Sea at the head of the long Gulf of Yenisei, which is separated from that of the Ob by a low and comparatively narrow peninsula.

The *Lena* rises about 30 miles from Lake Baikal ; it is the largest river of Eastern Siberia, and lies wholly within the Russian Empire. In its upper course the scenery is very picturesque. The only tributary of any importance which it receives on the left bank is the Vilyui ; but on the right from the Vitim plateau, the Olekma and the ample Aldan double the volume of the upper Lena. From the confluence of the latter stream the bed of the Lena has a breadth of from four to five miles from bank to bank, and in some places the river expands into lake-like reaches. Unlike the Ob and the Yenisei, the Lena enters the Arctic Sea by numerous branches which form an immense delta.

The *Amur*, formed by the union of the Shilka and the Argun, flows at first in the same direction as the upper Lena, then from the confluence of the two branches to its mouth it describes a semicircle of almost geometrical exactness. Few rivers have to traverse a country so broken with mountain ranges, the most important of which are the Great and the Little Khingan. Being as large as any of the three great northern rivers of northern Siberia the eastward course of the Amur gives it a special importance for the expansion of Russian colonisation towards the Pacific, and it is by the valley of a southern tributary, the Ussuri, that Vladivostok is reached.

Lake Baikal is the largest accumulation of fresh water in Asia, and is of enormous depth, the soundings in some places exceeding 700 fathoms, the average depth of the southern portion being 140 fathoms.

III.—CLIMATE AND ANTHROPOGEOGRAPHY

Climate of the Russian Empire.—In the first part of this description of the Russian Empire a simple statement of facts could alone be made without any attempt at explanation in the present state of our knowledge, but in what follows it is possible to explain the various distributions by reference to the configuration of the country, and, indeed, they might be deduced *à priori*. The whole Russian Empire, in one continuous mass, lies between the parallels of 35° and 75° N., and is most elevated in the south. Consequently the average temperature of winter must be low, and indeed in almost all parts of the country it is below the freezing point. All the rivers are frozen and the ground in most parts is covered by snow for several months, the only exceptions being some districts in the south. Russia is essentially continental in character; the ratio between the extent of its coast-line and its area is remarkably small, and the greatest stretch of coast is that which borders the icy Arctic Sea; from west to east there is not a single elevation to break the force of the polar winds, on the contrary, great mountain masses ranged along the southern frontier bar the way against any warm breezes from the tropics. Thus the climate of every region, indeed, of every town in the Russian Empire is more rigorous and more extreme as one goes from west to east, and all are more severe than in the regions and towns of western Europe situated in the same latitudes. The diagram of the mean annual temperature for Asia (Fig. 228) shows this clearly by the isotherms forming a constant angle with the meridians in almost all places and for all temperatures. The form of the winter isotherms is most interesting and suggestive from this point of view. The diagram shows how sharply the isotherms of winter bend to the south as they approach the interior of the continent. Orenburg, for example, has the same temperature as Arkhangelsk, which is 13° further north. Although fourteen-fifteenths of the vast solitudes of Siberia are as unknown from the climatic point of view as from any other, yet observations which have been made on the shores of the Lena and the Yana point to the existence of the pole of cold at Verkhoyansk (see Fig. 95), which is not quite so near the pole as is Bodö. The isotherms of summer, on

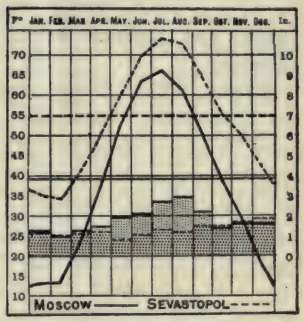

FIG. 211.—*Rainfall and Temperature of Moscow and Sevastopol.*

the contrary, run, on the whole, from west to east, inclining slightly towards the north, except on the Pacific coast, where they turn sharply southwards ; thus in summer Yakutsk has the same temperature as Moscow, although it is 6° further north. In a similar manner the lines of equal atmosphere precipitation and of equal humidity of the air incline towards the south as they run from west to east, the rainfall being least in the interior. Atmospheric disturbances propagate themselves with remarkable rapidity over the almost unbroken plain of the empire ; but the prevailing winds are different in each part of the country. In winter the cold dense air accumulates in eastern Siberia in the sort of hollow through which the Lena flows ; the sky is always clear, the weather calm and still, and in some parts of the region snow falls so rarely that it is impossible to use sledges during much of the winter. An opposite effect is produced in summer ; the same part of Siberia over which the barometer indicates the greatest pressure in winter has then the lowest pressure found in any continent, and thus, speaking generally, it is this part of Russia that is the centre from which the winds blow outwards in all directions in winter, and towards which they blow inwards from all directions in summer.

Flora.—The climate explains the flora, which in turn renders visible and defines the zones of climate. Along the margin of the Arctic Sea there are great stretches of marshy land, the bare ground of which only bears mosses, lichens, and little shrubs so stunted that they are no higher than the grass of a meadow ; this is the zone of the *Tundra*. To the south it is bordered by a region of *Low Forests*, in which birch, larch and silver fir grow vigorously enough to merit the name of trees. Still further south *Forests* of splendidly grown trees cover almost the whole country ; they include birch and conifers of many kinds, and here and there the clearings are cultivated. The region of deciduous forests, including the greater part of Central Russia, is that in which agriculture is most energetically carried on, the crops including rye, flax, and hemp, the principal commodities of Russia. The *Black Earth Region* is a broad zone which extends from the valley of the Dnieper to the base of the Urals, and here wheat, fruit trees, and rich grass bring prosperity to the country ; while south of the barren *Steppes*, the valley bottoms, the margin of the Black Sea, Bessarabia, and the Crimea, form a *Southern Zone*, where maize and the vine flourish. In the Trans-Caucasus, and in the south of the Crimea, where the winter temperature does not fall below the freezing point (Fig. 211), the olive ripens and even cotton may be grown.

The boundaries of the various zones of vegetation run on the whole from north-west to south-east ; for instance, the northern limit of wheat is north of 60° N. in Finland, while on the Pacific coast it is south of 50°. A glance at the map of summer temperature (Fig. 230) explains how in the southern zone it is possible to cultivate certain Algerian vegetables which only require great heat in summer, while the map of winter temperature

(Fig. 229) explains the absence of fruit trees in the eastern division of the same zone. The forests of European Russia occupy 450 million acres; the timber which predominates in the north is pine and fir, mixed with larch and cedar in the east, and with birch, aspen, and alder in the west. In the centre of Russia the commonest trees are the oak, the maple, the ash, and the lime. The area of woodland is diminishing with alarming rapidity; in some parts of the country which were densely wooded at the commencement of the nineteenth century, only a few trees are now preserved in gardens as a rarity. The destruction of forests increases the dryness of the climate, and the lakes and rivers are beginning to lose more by evaporation than they receive from rain, and some waterways which were formerly navigable are so no longer.

Fauna.—The fauna of the different parts of Russia is controlled by the land-forms, the climate, and the flora. The Polar bear, the Arctic fox, seals, and reindeer, such birds as the Polar wild goose, and fish like the cod, salmon, and trout, inhabit the land and waters within the Arctic circle. The forest region and the Urals shelter the stag, the weasel, fox, hare, bear, and wolf, as well as the lynx and the elk, which are disappearing; the wild boar only lives in the basin of the Duna, and the beaver is found only in the government of Minsk. The birds include the grouse, partridge, and the hazel hen, while the Salmonidæ and the Coregoni are characteristic fishes. The country bordering the steppe contains most of the carnivora of the forest belt, and in addition squirrels, foxes, and hares greatly abound, but the most characteristic animals are the *suslik* and the *baibak*, which ravage the corn-fields. Birds are less numerous than in the forests. The fish include carp, silures, and sturgeon, and the sterlet of the Volga is justly famed for its caviare. What has been said of the fauna of European Russia applies equally to the fauna of Siberia, the Ural mountains interposing no barrier to the movement of species. The only difference is that the Siberian species are larger in size than those of European Russia, and the fur-yielding animals are very important. In the east and south a tiger may occasionally be met with, and on the Pamirs the *Ovis Poli*, or great mountain sheep, is still abundant.

Races.—The nucleus of the Russian population is formed by the Slavonic branch of the Aryan people, who occupy the most of Russia and Poland in compact masses, speaking different dialects. The north-west and the north are occupied by the Finns. Scattered amongst the Slavs in tribes and families there are many Asiatic races—the Samoyeds, Zyrians, and Lapps in the north, and the Kirghiz and Kalmuk hordes in the south. The west is occupied by another Aryan race akin to the Slavs, but quite distinct, that of the Letto-Lithuanians. The Tatars in the east, and the Jews in the south-west, complete the main racial elements of European Russia. The Caucasus is occupied by Georgians and other Caucasian peoples, Turks, Aryans like the Armenians and Kurds, and Mongol Kalmuk tribes.

Asiatic Russia is the native home of numerous tribes, some scattered and others grouped in compact masses: Samoyeds, Tunguses, Yugaghirs, Ostyaks, Voguls, Koryaks, Kamchadales, Turks, Tatars, Mongols, Gilyaks, and a host of others.

The Russian Slavs may be distinguished into three distinct groups. (1) The *White Russians* occupy the forest-covered plains which extend from the left bank of the Duna to the marshes of the Pripet. (2) The *Little Russians* occupy the vast territory between the Donets, the San, and the sources of the Tisza. (3) The *Great Russians* inhabit the remainder of Russia, especially the centre and the north. Generally speaking the Russian Slavs differ in appearance from their brethren of Austria and the Balkan States. Mixture has taken place chiefly on the borders of the various groups; thus in the north Russians may be met with the flat features and high cheek-bones of the Finns, and in the south the Slavs have mixed with the Mongols, Turks, and Tatars.

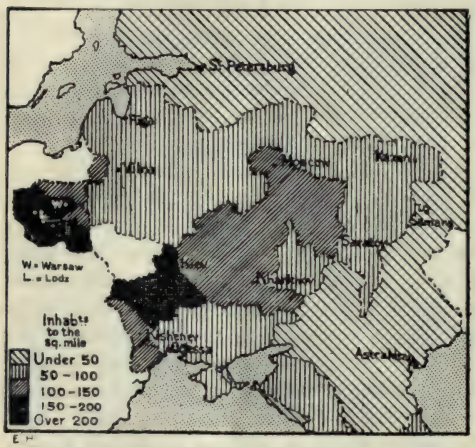

FIG. 212.—*European Russia—density of population.*

At the commencement of written history, about 900 years ago, the Slavonic people were not numerous in the plains of what is now Russia; they occupied scarcely a fifth part of the territory, all the rest of the country belonged to the Lithuanians, the Finns, and the various wandering or settled tribes which had come from the steppes of Asia. At the present day the change is marvellous; Russians and other Slavs inhabit four-fifths of the empire, and have spread to its furthest limits, in Siberia, in Turkestan, and in the Caucasus. Many minglings of diverse populations have necessarily taken place during those nine centuries of Slavonic expansion throughout the territory occupied by the ancient inhabitants. The Great Russians are model colonists; the habit of migration is hereditary with them, their ancestors migrated into the Muscovite forests, and the descendants of these pioneers have gone on from clearing to clearing, from steppe to steppe, have climbed the slopes of the Caucasus and of the Altai, and, descending the Amur, they have colonised the shores of the Pacific.

Population.—According to the first and only census of the Russian Empire, which took place on February 7, 1897, the population numbers

130 million inhabitants. This figure is exceeded only by the British Empire and China. The distribution of population is very unequal, as the accompanying map of the population of European Russia clearly shows (Fig. 212). While some Russian governments have as many as 360 inhabitants to the square mile (Petrokow in Poland) others have not so much as one inhabitant for four square miles, as in the coast province of Siberia.

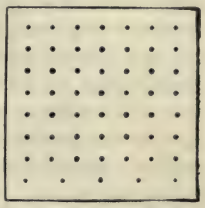

FIG. 213.—*Average population of a square mile of European Russia.*

Agriculture.—Agriculture occupies nine-tenths of the population, and 900 million acres, forming about two-thirds of the whole territory, is cultivable land, of which 225 million acres consist of the celebrated *Chernoziom*, or black earth, stretching from the Ural to the western frontier of the empire; but on account of the slight density of the population only about 240 million acres are actually cultivated. The chief place amongst the products of the soil is taken by cereals, and then follow flax, hemp, potatoes, beetroot, and tobacco; in the southern zone, especially in the Crimea, fruit trees are largely grown, and the vine is cultivated as far north as the 48th parallel.

The rearing of cattle acquires considerable importance, especially in the grassy steppe land. Sheep are most numerous amongst the live stock, followed in order by horned cattle, horses, camels, buffaloes, goats and pigs. The fisheries are very productive, especially in the Volga, the Ural, and the Siberian rivers. Hunting and the collection of furs is the exclusive occupation of the native tribes in the Siberian solitudes.

Mines.—Mining is carried on most extensively in the Urals, the Altai, and the Sayan mountains, and in Transbaikalia. The most important minerals produced are, in the order of their value, gold, silver, copper iron, salt, coal (in the basin of the Donets and the Oka), and petroleum at Baku, Kerch, and Taman. Platinum, lead, tin, and zinc are found in smaller quantities; some precious stones occur in the Urals and Transbaikalia, and marble is quarried in Finland and the Crimea.

FIG. 214.—*Average population of a square mile of Siberia.*

Industries.—Not very long ago all manufactured goods were imported into Russia from abroad, or were made locally on a small scale, but during the last few decades Russia has been making itself more and more independent of foreign manufactures. There are now as many as 100,000 factories and workshops of all kinds, most of them being situated in the great centres of population, especially St. Petersburg and Moscow, in Poland, and in the mining districts; but six-sevenths of the industrial population work in their own houses (*Kustari*). The first place amongst the industries belongs to the distilleries and breweries; cotton factories and sugar refineries

come next, and then follow flour mills, brick works, woollen factories, iron works, tobacco manufactories, and textile mills for linen and hemp.

Trade.—The internal commerce of Russia is considerably developed, the number of merchants being more than 80,000. Much of the trade is still carried on in great fairs, to which people come from far and near; they are held in many of the towns in European Russia, the most celebrated being that of Nizhnii-Novgorod. The navigable rivers of Russia are not very extensive compared with the size of the country. European Russia does not contain more than 22,000 miles of navigable waterway, or one mile for every 90 square miles of area. Since all the rivers are frozen during the cold of winter, and much reduced in depth by the dryness of summer, navigation upon them is in many cases confined to the period of the spring floods. The one advantage which the rivers of Russia present from a commercial point of view is their divergence from neighbouring sources, which facilitates transport from one to another, and the construction of canals. The Russian canals are of much commercial importance; the greatest of these, as regards the traffic carried on by it, is the system which unites the Caspian and the Baltic by the Volga and Neva, the Marie canal, those of Tikhvin, and of Vyshnii-Volochek. The canals uniting the Black Sea with the Baltic by the Dnieper on the one side, and the Duna, the Nieman and the Vistula on the other, are less important, being only available for barges. Considering the area of the country, the railway system is not as yet very extensive, though growing steadily. The cart roads are generally very bad, especially in spring and autumn. Winter is the best season for the transport of goods, for then the whole plain of Russia, with its rivers, lakes, and marshes, is covered with a uniform pavement of snow, and sledging is universal. Foreign trade by land is carried on with western Europe, and with the various countries of Asia on the east and south. The most important trading towns near the western frontier are the ancient Kiyev (Kieff), on the Dnieper, Warsaw, the old capital of Poland, on the Vistula, and Vilna. On the Asiatic side the most important centres are Orenburg, Troitsk, Petropavlovsk, Semipalatinsk, and Kyakhta.

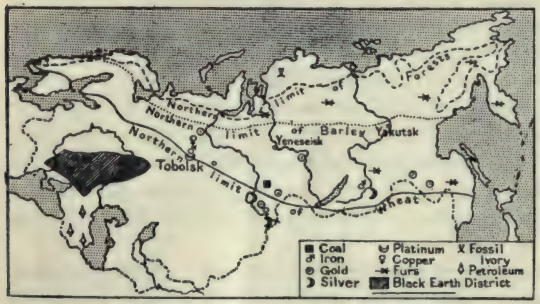

FIG. 215.—*The Resources of the Russian Empire.*

Seaboard and Shipping.—The Russian Empire has 280 square miles of area for every mile of coast, and this comparative isolation from the sea is increased practically by the fact that the Arctic coast is almost

always and everywhere closed by ice ; the seas of Bering, Okhotsk, and of Japan, although free for several months of the year, border an uninhabited country far removed from all the great centres of population ; near these centres the White Sea is only navigable during three months of the year. The Baltic is a dangerous sea, and for five months the greater part of the coast is blocked by ice ; recent attempts to keep the harbours open by the use of ice-breaking steamers have to some extent mitigated this disadvantage. Finally, the Caspian is enclosed by land, affording no outlet to the ocean. The Black Sea and the Sea of Azov alone are nearly always ice-free, but the former, though deep and safe for shipping, has few harbours, and the latter is too shallow to be useful ; moreover they are both separated from the ocean by a series of straits commanded by foreign countries. These facts explain the long struggle of Russia to gain a footing on the Baltic, which was accomplished under Peter the Great, and the recent tendency to expansion towards Constantinople and the Mediterranean on the one hand, and towards the Yellow Sea on the other, where Port Arthur and Dalni (Ta-lien-wan) were held for a time. The nature of its coasts explains why Russia possesses few great seaports. The most important on the Baltic are St. Petersburg with Cronstadt, Narva, Revel, Riga, Windau and Libau; on the Black Sea, Odessa, Nikolayev, Kherson, Eupatoria, Theodosia, Kerch, Berdyansk, Taganrog, Mariupol, Rostov on the Don, Yeisk and Poti; on the Arctic coast, Arkhangelsk and Alexandrovsk; on the Caspian, Astrakhan, Derbent and Baku, and on the eastern coast the Pacific ports, Vladivostok, Port Arthur, and Dalni.

Government.—The Russian Empire was an absolute autocratic monarchy, in which the Emperor or Tsar was the temporal chief of all his subjects. He made the laws, declared war and concluded peace in his own name, and on his own responsibility. The only dignitaries who took part in the legislative powers of the emperor were the eleven Ministers, the Council of State, the Senate, and the Holy Synod. The *Council of State* ought in principle to take cognisance of all laws and of all important measures before they are submitted to the sovereign, but it had no right of initiative for the preparation of new laws. The "*Directing Senate*" created by Peter the Great was charged with the registration and publication of the imperial ukases, and it also served as the supreme court of appeal in judicial matters. The *Holy Synod*, also instituted by Peter the Great, is presided over by the Metropolitan of St. Petersburg and Novgorod, and is composed of a certain number of prelates, while a lay procurator, nominated by the Emperor, represents the wishes of the sovereign. In 1905 an elective parliament called the *Duma* was convened by the Emperor, who however retains his personal power and legislative initiative. In 1864 the statute of territorial institutions had been promulgated, which recognised the elective principle in the conduct of business for each government and for each district. These local institutions bear the name of *Zemstov*, and are composed of representatives drawn from all classes of society—nobles,

citizens, traders, and peasants. The President of the Zemstvo is almost always the marshal of the nobility, and the sittings are very short. The governor of the province has the right of suspending any decision of the Zemstvo which he considers to be contrary to the laws or to the well-being of the State. The municipal institutions are analogous to the Zemstvo. The grand-duchy of Finland has preserved some remains of its ancient constitution in a national parliament, consisting of four estates—the nobles, the clergy, the burghers, and the peasants. The Central Asiatic State Bokhara has still nominally its own sovereign, but from 1873 it has been practically a Russian dependency. The khanate of Khiva has also been under Russian supremacy since 1872.

Administration of Justice.—The organisation of justice, established in 1864, is justly considered as one of the greatest reforms of the Tsar Alexander II. As yet the Russian courts, and especially the juries, have shown that clemency which is one of the most conspicuous traits of the national character, and have not aspired to the ideal of implacable severity which prevails in other countries. In principle the judicial power is independent of the administrative ; trials are public, and serious cases have to be submitted to assize courts with a jury. In reality, however, several offences such as bigamy, resistance to local authorities, and malversation of public money, are reserved from the privilege of trial by jury ; political crimes, which consist in the spreading of more or less advanced ideas, fall under the jurisdiction of special courts, and for some years even this semblance of a fair trial has been set aside by a private process of the administrative authority which banishes the delinquents or the suspects to the north of Russia, or even to Siberia, for periods which may extend to as much as ten years. Since 1864 Justices of the Peace had been elected by representatives of the Zemstvos, but these were changed in 1889 for "chiefs of the district" (*Uyezdnyi nachalnik*) in the country, and "town magistrates" (*Gorodskoi sudia*) in the towns ; both being nominated by the administration.

Books, magazines, which are very numerous in Russia, and newspapers when containing objectionable matter are not, as in all other countries, made the subject of investigation in the courts, but are judged privately by the Government ; a committee of Ministers has, since 1872, exercised a censorship without appeal on all literary works, and interdicted or confiscated those which they considered it undesirable to place before the public. Newspapers are subject to the special disability of being only supplied to subscribers, the sale of single numbers being prohibited.

Education.—There are in Russia nine universities and 42 special colleges. Secondary instruction is given in the Gymnasia and other schools under the charge of the Ministry of Education, as well as in the Cadets' College, which is under the Ministry of War. These institutions number in all 900. Elementary education is much neglected ; in European Russia there are about 65,000 schools, with rather more than 3 million

pupils of both sexes, a proportion of one pupil for 34 inhabitants; in the Caucasus there is one pupil for every 50 inhabitants, and in Siberia a smaller ratio. The expenditure upon education in 1896 was about £2,600,000, or £1 for 50 inhabitants. In contrast, it may be noted that in the United Kingdom, with one-third of the population of the Russian Empire, the schools are attended by 5,400,000 pupils, or one for every seven inhabitants, and the government expenditure on primary education is £9,000,000, or more than £1 for every five inhabitants.

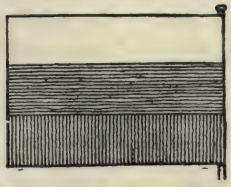

FIG. 216.—*The Russian Flag.*

Army and Navy.—Military service is universal and compulsory; the period of service in the regular army is five years for the illiterate, but reductions are made in proportion to the degree of education of the conscripts. The effective strength of the army on a peace footing is about 42,000 officers, and more than 1,000,000 men. In case of war Russia can place in the field upwards of 4½ millions of men, and more than half a million horses. The most important fortresses in European Russia are Warsaw, Ivangorod, Novo-Georgievsk, and Brest-Litovsk, forming what has been termed the Polish Quadrilateral; Vilna, Ust Dvinsk (which defends Riga), Dvinsk (formerly called Dunaburg), and Vitebsk, between the Polish frontier and the Duna; Bendery and Akkerman, which defend south-western Russia. In the Caucasus Alexandropol, Kars, and other towns are strongly fortified, and in Asia Samarcand, Tashkent, and Vladivostok may be mentioned, but there are many smaller forts at different points on the frontier.

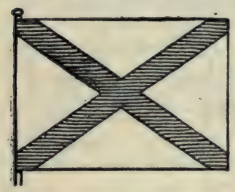

FIG. 217.—*The Russian Naval Ensign.*

In the navy the period of active service is seven years. The Russian fleet in Europe and Asia contains 250 vessels with 38,000 men, and its annual cost is about one-fifth that of the army. The chief fortified seaports are Sveåborg in Finland, Cronstadt and Ust Dvinsk on the Baltic, Sevastopol and Nikolayev on the Black Sea, Vladivostok and Port Arthur (on Manchurian territory leased from China) in Asia.

IV.—TOWNS

The Towns of Russia.—With a few exceptions the towns of Russia are hardly more than villages; the houses are usually of wood or brick, and the streets are ill-paved when they are paved at all. In rainy weather the foot passengers have to wade through the mud, and in the drought of summer they are half blinded with driving dust. The towns contain few or no buildings of any interest. In 1897 there were in the Russian Empire twenty towns with a population exceeding 100,000, but in addition to

hese several of the smaller towns deserve to be mentioned on account of specially interesting circumstances.

St. Petersburg.—*St. Petersburg*, the modern capital of Russia, ranks fifth by population amongst the great towns of Europe. It occupies six large and many small islands at the mouth of the Neva, but its true centre is now on the left bank of the Great Neva, south of the islet on which Peter the Great founded his new capital two centuries ago. Here stand the Winter Palace, the Admiralty, the Cathedrals of St. Isaac and Kazan, the equestrian statue of Peter the Great, based upon the heaviest mass of rock that has ever been transported by human agency, and the column of Alexander, a granite monolith 75 feet in height. The part of the town which was first built contains the Fortress of Peter and Paul, where so many prisoners of State have been confined, and the church in which the Emperors are buried. On Vassili Ostrov (Basil Island), the University,

FIG. 218.—*St. Petersburg and surroundings.*

the Academy of Sciences, the Exchange; in the quarter of Viborg, the School of Medicine, and the Artillery College are situated. The streets of St. Petersburg are wide and regular with lofty houses of five or six stories, but there are few public gardens and no thoroughfares planted with trees. The climate is unhealthy, and the mortality exceeds the birth rate so that the population is only maintained by the immigration of people from all parts of the empire, and even from abroad. Although St. Petersburg is essentially a town of soldiers and government officials (*Chinovniks*) it has also considerable industrial importance: some large establishments, belonging to the State, manufacture tapestry, glass and china, but the main industrial activity is found in the factories of private firms. The commercial movement of St. Petersburg by sea amounts to a quarter or even a half of the total trade of Russia, but most of the traffic in the ports of the capital is carried on by foreign vessels; the British, German and Norwegian flags are more common amongst

the merchant shipping than the Russian, and indeed many of the vessels sailing under this flag belong to Finnish owners. Education of every grade, from the University downwards, is more developed than in any other town in Russia, and in all matters concerning literature, science and art, St. Petersburg leads the empire. The Public Library ranks next to the British Museum Library in London and the National Library in Paris. The museums are amongst the finest on the continent. The most important is the Hermitage, which contains a great number of pictures by the most famous European painters, and a unique selection of the works of Russian artists, little known in western Europe; but the glory of the museum is the collection of ancient Greek remains of the best period of Hellenic art and the Scythian antiquities from the Tauride and the south of Russia. A city of sumptuous palaces St. Petersburg completes the splendour of its state by a ring of parks, royal residences and pleasure resorts at *Peterhof*, *Oranienbaum* and *Pavlovsk*. The village of *Pulkovo*, about twelve miles south of the capital, is the site of the national observatory which sets the meridian for Russia. It is approximately 30° 20′ east of that of Greenwich. Twenty miles to the west of St. Petersburg the powerfully fortified naval port of *Cronstadt*, on an island, forms the centre of the chain of impregnable fortifications which protects the mouth of the Neva.

North-Western and Northern Towns.—*Riga* is situated at the head of the Gulf of Riga on the Baltic, at the mouth of the great navigable Duna, a river whose sources rise close to those of the Volga and Dnieper. The harbour is the third in the Russian Empire in order of trade, but its prosperity is hampered by the length of the winter, during which all traffic is stopped by ice for several months. More than one third of the trade of Riga is with Great Britain, which sends salt, coal, tobacco, spirits, colonial commodities and manufactured goods, and receives in exchange hemp, flax, grain, tallow and timber. The old Hanseatic town still presents a mediæval appearance in its central parts, where some interesting buildings have survived, including the palace of the old Teutonic Knights and the Guild halls; but all round beyond the boulevards modern suburbs extend with wide and straight streets. The Polytechnic School is the principal educational establishment. The river is crossed by a viaduct nearly half a mile in length, and all approaches are protected by fortifications.

Vilna, the ancient capital of Lithuania, on a tributary of the Niemen, contains an ancient cathedral founded by Yagello, and historic castles which have been in ruins since the Muscovite occupation. Vilna was one of the centres of culture in White Russia, and the first printing office in the empire which employed the Cyrillic character was founded here in 1525. The historial museum is one of the most remarkable in Russia, and there is also a Geographical Society.

Arkhangelsk (Archangel) was founded at the mouth of the Northern Dvina on the White Sea in the twelfth century, but only became important

when the English navigators seeking the North-East Passage arrived there by chance in the sixteenth century, when it was the only Russian seaport. During the few months when the sea is free from ice Arkhangelsk exports flax, hemp, oats and other grain, timber, tar, tallow and fish oil. A colony of English workmen is established in the neighbourhood of the town, taking charge of the great saw-mills. The railway recently extended to Arkhangelsk from Moscow makes it the most northerly terminus in Russia.

Yekaterininsk, newly founded on the Murman coast, at the mouth of the river Kola, is an ice-free port which will be of value when placed in communication with the railway system.

Towns of Finland.—*Helsingfors*, the capital of the Grand Duchy of Finland, is a well-built European town laid out with parks and promenades, and possessing the most northerly botanic garden in the world. Its university is a centre of scientific activity, and the library contains a valuable collection of documents bearing on Finland and its history. It is an active seaport, trading particularly with England. The formidable defensive works of *Sveâborg*, on the rocks of the Seven Islands, command the channel leading to Helsingfors and protect the town from attack on the seaward side.

Âbo, the most ancient city in Finland, is a centre for the maritime trade of the gulfs of Bothnia and Finland. It is the second town of the grand duchy in population, and third in trade, the staples of the port being timber and grain. The astronomer Argelander compiled his famous star-catalogue at Âbo. *Viborg* is the most frequented harbour of Finland, and stands second in the value of its trade, on account of its favourable position, being near St. Petersburg and a terminus of railways and canals leading to the interior. Large vessels cannot reach the port, but discharge and load at *Trångsund*, a strongly fortified roadstead eight miles further south. The chief export is timber.

Towns of Poland.—*Warsaw* (*Warszawa* in Polish), situated on a great navigable river in the centre of a fertile plain, is the point of convergence of commercial routes from all parts of Russia and western Europe, and is destined one day to become one of the greatest cities in Europe. The ancient palace of the kings of Poland, surrounded by terraced gardens rising immediately on the bank of the river, is the most remarkable of the public buildings, and contains a library and collection of works of art. From it diverge the principal avenues lined with hotels and public buildings. The old town with narrow streets extends towards the north, while the newer quarters with their wide avenues are situated towards the south. A railway viaduct and a seven-arched bridge across the yellow waters of the Vistula unite the city to the suburb of *Praga*. There is a university, founded in 1816, but closed after the insurrection of 1830–31, until it was re-opened in 1861. It does not enjoy all the rights which the other Russian universities possess, and the teaching must be given entirely in the Russian language. Warsaw also possesses a School of Arts and

Industries and a musical Conservatoire. The capital of Poland is distinguished by remarkable industrial and commercial activity.

Lodz, which was only a poor village of less than 800 inhabitants in 1821, is now the second city in Poland by population as well as by industry. It is not an ordinary town ; it consists of one street about six miles in length on each side of which there are hundreds of factories where seven-eighths of all the cotton goods manufactured in Poland are produced. *Czestochowa* with a celebrated convent is, next to Kiyev, the most frequented place of pilgrimage in the Slavonic world, and it is also a busy market town, doing a large trade in cattle and in cloth. The convent perched on the summit of a hill looks like a fortress, and was indeed one of the chief castles of Poland in former days. *Lublin* is the second Polish town in size, if the great agglomeration of population in the straggling villages of Lodz is not considered. It became famous by the stormy meeting of the Diet of 1568, which decreed the incorporation of Lithuania with Poland.

Moscow.—The great city of *Moscow* is situated almost in the geometrical centre of European Russia, and thus forms a focus where roads and railways from all parts of the country converge. In its larger outlines the plan of Moscow resembles that of Paris, the same winding river and the same circular boulevards appear ; but while the Seine is large enough to make Paris the principal port of France, the Moskva which traverses the ancient capital of Russia is only navigable for small vessels. The centre of the town is the Kremlin or fortress situated on the left bank of the Moskva, and constituting a picturesque pile of cathedrals, monasteries, palaces and barracks. There rises the tower of Ivan the Great, 266 feet high, and an object of veneration, almost of worship to the people. Some of the buildings of the royal palace are remarkable in their architecture, recalling in turn the palaces of Venice and those of India, and presenting a confused congeries of domes, turrets and colonnades painted vividly in green and red and yellow. Besides the Kremlin there is another fortified enclosure, that of *Kitaigorod*, the commercial city containing many remarkable buildings, including the famous church of Basil the Blessed (*Vassili-Blazhennyi*) ornamented with tiles and variegated colours, the details of its architecture purely Byzantine, but entirely Muscovite in its general appearance. Since 1755 Moscow has been the seat of the most frequented university in Russia, which has exercised considerable influence on all philosophical and literary movements in the

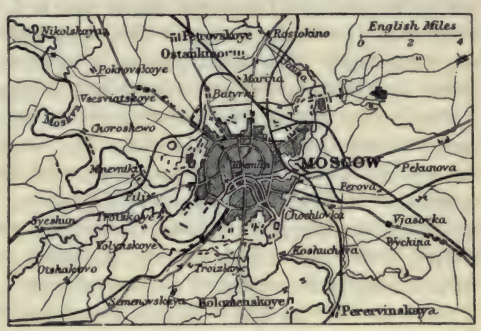

FIG. 219.—*Moscow.*

empire, especially between 1830 and 1848. Moscow is a great centre of publishing, and the books and prints produced there are carried to the most remote provinces of Russia to be sold or exchanged for the products of the country. It is one of the chief industrial centres, the manufactures of the government of Moscow amounting to one-fifth of the whole production of the empire.

Tula is the chief station on the railway between Moscow and Kharkov, in the centre of a manufacturing district. Several thousand workmen are employed in the manufacture of arms in one factory which produces 70,000 rifles as well as swords and instruments of iron and steel. Tula is great in making cutlery, mathematical instruments, machinery and metal work of every kind ; no less than 200,000 of the samovars, of which every Russian family possesses one, are turned out each year.

Towns of the Volga Basin.—*Nizhnii-Novgorod*, a town of 100,000 inhabitants, is one of the most important in Russia on account of its great annual fair, which is not only the most frequented in the empire but in the world. The town stands 320 feet above the river at the confluence of the Oka. *Kazan* is first mentioned in the Russian Annals in the year 1376. The town having been removed in the fifteenth century more than three miles back, is no longer situated on the left bank of the Volga, except during floods, when the great river spreads over the plain and reaches the base of the little hill on which Kazan stands. All the houses are modern with the exception of the ancient red brick tower of Sumbek. Kazan contains a university and a Tatar printing establishment, which produces a great number of books, as well as an ecclesiastical college dating from 1646. It is also an important commercial town, half of its inhabitants being engaged in manufactures and trade. *Saratov* is the largest city of the lower Volga, possessing factories of every kind and forming the centre of trade for the German colonies established along the river. There is considerable river navigation, which has increased in amount since the establishment of direct railway communication with Moscow. The ancient town of *Astrakhan* occupies the site of Atel or Itil, one of the capitals of the kingdom of the Khazars. The minarets of the mosques rise here and there amongst the spires and gilded bulbs of the churches, and with the numerous canals crowded with the shipping of the Volga and the Caspian give an air of variety very unusual in Russian towns.

Perm is situated in the middle of a great mining region almost at the confluence of two great fluvial waterways, the Kama and Chusovaya. It is an important place for trade between European Russia and Siberia, especially since the construction of a railway across the Urals to Tyumen. This line passes through *Yeketerinburg*, the residence of the Director-General of the Ural mines, where there are assay offices, gold smelting furnaces, and establishments for cutting the precious stones found in the neighbourhood.

Towns on the Dnieper.—*Kiyev* (Kieff), the "Holy Town," was

destined from the first by its position to be one of the centres of gravity of Russian history. It is situated almost in the centre of the basin of the Dnieper, below the confluence of all the upper tributaries, where the main stream concentrates in one channel their collective waters and trade. Kiyev stands on a terrace from 300 to 400 feet above the level of the river; the houses are ranged along the stream, but at some distance from the water, for a length of six miles. Some of the avenues are as wide as squares; masses of poplars growing here and there on the slopes contrast their greenery with the glitter of the gilded cupolas. The Church of St. Andrew, the Cathedral of St. Sophia and the Monastery of Pechersk, the holiest place in all Russia, are the most famous of the many religious edifices in the town. The university ranks third amongst those of Russia; there is also an ecclesiastical college which attracts students from all Slavonic countries, and a polytechnic institute. Two great bridges cross the Dnieper below the town. *Kherson*, near the mouth of the Dnieper, is the capital of the government which bears the same name and is an active business town, less important than Odessa or Nicolayev, but yet exporting large quantities of wood, cereals and hides. *Nicolayev* may almost be considered as a town of the Dnieper estuary, although situated at the junction of the Bug and Ingul. It is the chief naval station on the Black Sea, and is equipped with extensive dockyards, machine-shops and provisioning depôts, which employ thousands of workmen. There are strong fortifications, and a great floating dock anchored in the Bug can receive the largest battleships. Apart from its pre-eminence as a naval port the harbour is acquiring a considerable amount of export trade, and the town is growing rapidly. *Yekaterinoslav*, a new town, has acquired importance during the nineteenth century on account of its position at the great bend of the Dnieper above the rapids, where the river is crossed by a bridge more than three-quarters of a mile in length.

Other South Russian Towns.—*Odessa* is the most important seaport of the Black Sea, affording safe anchorage for ships. Being a town of recent formation it has, next to St. Petersburg, the most European aspect of all the towns of Russia. It presents a beautiful appearance from the sea, as it is situated on the highest part of the terrace of the steppe. Handsome houses line a promenade on the edge of the cliff whence a monumental stairway leads down to the quays and the harbour. In the central part of the town the houses, built in the Italian style, are laid out in wide and handsome streets. The university of Odessa is one of the smallest in Russia. The population is extremely mixed, the principal merchants being Jews, Italians, Greeks, Germans and Frenchmen. *Kharkov*, which was a simple village in the middle of the seventeenth century, has grown, thanks to its position intermediate between the Dnieper and the Don, and between Kiyev and Taganrog. The fairs held in Kharkov are amongst the most active in Russia, and the commerce and

industry of the town is well developed. It is also an intellectual centre of some importance, having a flourishing university, founded in 1804. *Rostov*, on the Don, is a great commercial town where nearly 3,000 coasting vessels come each year laden with cereals, flax, wool, tallow and other commodities. It is the gathering place of the harvesters, haymakers and vine-dressers who assemble to offer their services to the proprietors of the surrounding country ; but the town has no other claim to consideration. *Kishinev* is a large village in Bessarabia, with wide streets thick with mud or smothered in dust, according to the season, and serving as a market for the grain and live stock of the surrounding agricultural country.

Orenburg, formerly a fortress, is important from the strategic point of view, for it is situated on the right bank of the Ural river which separates Russia from the Kirghiz steppe, and inhabited by nomads who were turbulent and semi-independent some fifty years ago. It has lately become an important town, and the industrial population has steadily increased during recent years, while a railway is being built to Tashkent.

Sevastopol is a fortress celebrated for its great siege by the allied armies in 1854, and now it mingles ruins of modern date with those of high antiquity extending back to the times of the Scythians and the Greeks. Ruined by the disasters of the Crimean war, the population of Sevastopol was reduced to 6,000 in 1865 ; but the construction of a railway which attaches it to the continental system, and its situation on a fine bay have restored the town to prosperity. Stores for grain have been built in the neighbourhood of the port, a monumental railway station takes the place of an old redoubt, and the famous hill of the Malakhov has been converted into promenades. The port has recently been reserved for Russian naval vessels.

Caucasian Towns.—*Tiflis* stands on the two banks of the Kura on a valley floor surrounded by grey heights, rising to 1,200 and 1,500 feet above its level. The town is divided into two parts, an Asiatic quarter which recalls Constantinople, and the new town which has sprung up since the Russian conquest, and contains fine shops and all the equipment of a European city. One-third of the inhabitants of Tiflis are Armenians ; the Russians only compose one-fifth of the population. There are no buildings of special interest, but a valuable Natural History Museum. Tiflis contains several scientific societies ; its Geographical Society has published many standard works on the geography and ethnography of the Caucasus. *Baku*, an ill-built, irregular dusty town of Asiatic appearance, is an active seaport on the Caspian. A railway connects it with *Poti* and *Batum* on the Black Sea, and another line has been opened to *Derbent*, which unites it to the railway system of European Russia. All the inhabitants of the neighbourhood are occupied in refining petroleum and preparing bitumen.

Towns of the Trans-Caspian Railway.—The railway across the Trans-Caspian district of Turkestan is of immense strategic value, for it can throw a great body of troops with extreme rapidity against the

Afghan or Indian frontier. The line was commenced in 1884 and now extends to Tashkent on one side and to Kushk in the vicinity of Herat in another. The chief towns through which the railway runs are *Askhabad*, the administrative capital of the Trans-Caspian province; *Merv*, which disputes with Balkh the title of the "Mother City of Asia," once a centre of science; and *Bokhara* which, under Russian protection, only since 1873, shines in the history of human thought. Bokhara, formerly a town of poets, doctors, and illustrious men of science, now retains only the dead shell of its old intellectual life. Routine Moslem instruction is still given in more than a hundred "madrassees" (schools), but the science has vanished. There are still, however, some interesting industries, including the manufacture of fine cotton fabrics, ornamental leather and silk. From a commercial point of view the capital of the Emirate of Bokhara has always been great as the meeting-place of merchants from the markets of Russia, India, Afghanistan, Persia, and China. *Samarcand* was in ancient days an illustrious city in the development of human knowledge, and also one of

FIG. 220.—*The Trans-Caspian Railway.*

the largest towns of Asia. When besieged by Jenghiz Khan it was garrisoned by an army of 100,000 men. Subsequently it was Timur's capital, but most of the palaces and mosques of that period are now in ruins. A few scattered relics remain, here a piece of wall, there a tower or a cupola; the mosque containing Timur's tomb in particular is surmounted by a cupola of rare beauty. A still finer mosque is that of Shah Zindeh, the most splendid in all Central Asia. The Russian quarter of Samarcand has regular streets, gardens, and wooded avenues, contrasting with the irregular plan and ruined architecture of the native city. *Tashkent* is scattered over a space about eight miles long and five wide. The houses, most of which are low, are hidden by the verdure of poplars, willows, and other trees which border the irrigation canals. The Russian quarter, in spite of the recent occupation, is already of importance, and consists of one-storied houses built of sun-dried bricks, the roofs made of willow branches and reeds covered with a layer of clay and turf. The chief industries are the weaving of silk stuffs and the tanning of leather. There is an astronomical observatory and a geographical society in the town. *Kokan*, which in 1870 was the capital of an independent State of the same name, is a modern city for this part of

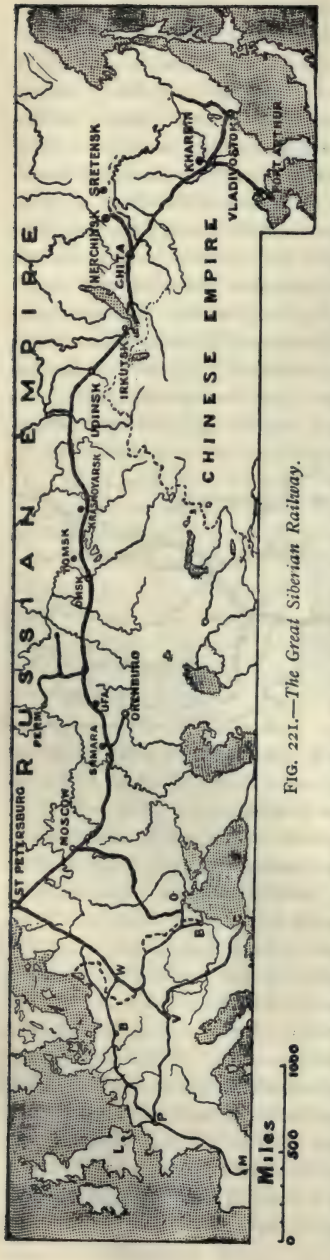

FIG. 221.—*The Great Siberian Railway.*

the world, with fairly wide and regular streets, large gardens, and the best equipped bazár in Russian Turkestan.

Khiva.—The capital of the Khanate of Khiva is only an agglomeration of mud hovels through which wind narrow roads of deep mud or thick dust according to the season. Before the Russian expedition of 1873 it was one of the chief slave-markets in Asia, but the industry and trade of town and State are now of little importance.

Towns on the Great Siberian Railway.—Although the Russian Empire is far behind other European States in the extent of its railways when compared with the area of the country, it actually possesses the greatest length of railway lines after the United States. From Alexandrovo, on the German frontier, the iron ways run without a break to the northern shore of Lake Baikal, and on from the southern shore to Vladivostok and Port Arthur on the Pacific, a distance of 5,000 miles as the crow flies. The great railway across Siberia has a very high importance, not only for Russia but for the whole world, since it places western Europe in direct and rapid communication with China and Japan. The line commences at Samara on the Volga, and passes through *Ufa* on the Belaya and *Zlatoust* situated in a smiling valley of the Urals, a town of metallurgical works and manufactories of small-arms, especially rifles and sporting guns. *Omsk*, farther on upon the Irtysh, is an important centre of Western Siberia in the midst of the steppes, but *Tomsk*, which possesses the one university of Siberia, is left on one side of the railway, and the line goes on through *Krasnoyarsk* on the Yenisei, the chief town of the government of Yeniseisk and the commercial centre of the neighbouring valleys rich in mines. *Irkutsk*, a town of

wide and straight streets, was founded on the right bank of the Angara, near its exit from Lake Baikal, in 1669. It possesses the oldest building in Siberia, a fort inscribed with the date 1661. It is not only an industrial centre, but a focus of intellectual life as well. The Geographical Society publishes important works on Russian Asia and the neighbouring countries. Farther east, beyond Lake Baikal, the line passes *Chita*, the capital of Transbaikalia. A branch of the great railway follows the Amur valley to *Nerchinsk*, the chief trading centre of a great mining region where silver-lead, mercury, copper and iron are worked; and to *Sretensk*. From Chita the great Siberian railway runs south-eastward through Manchuria to *Kharbin*, a new Russian city, and thence one branch goes to Vladivostok, and another to Port Arthur and Peking.

Vladivostok is situated on the only sea freely open for almost all the year, which bathes the shores of the Russian Empire. With the increase of agricultural population and the stimulus of its approaching position as a railway terminus, Vladivostok promised to become the Constantinople of the East as its founders hoped when they established it in 1860, the name they gave meaning Rule the East. Though the population of the town has grown to nearly 30,000 its future prospects were compromised by the rise of the leased harbours of Port Arthur and Dalni, but the loss of these in 1905 as a result of the war with Japan restores its earlier importance.

FIG. 222.—*Railways of European Russia.*

STATISTICS OF THE RUSSIAN EMPIRE.

Great Political Divisions.	Area in sq. miles.	Population in 1897.	Density of Population per sq. mile.
European Russia	1,902,202	94,215,415	51
Poland	49,159	9,455,943	193
Finland	144,255	2,527,801	17
Caucasia	180,843	9,248,695	54
Siberia	4,833,496	5,727,090	1
Steppes	908,073	5,451,385	4
Turkestan	471,371	4,270,299	9
Total	8,489,399	130,896,628	15

	Area in sq. miles.	Population.
Largest administrative division, Yakutsk	1,533,400	261,531
Most populous „ „ Kiyev	19,690	3,576,125

POPULATION OF CHIEF TOWNS IN 1897.

St. Petersburg and suburbs	1,267,023	Yaroslav	70,610
Moscow and suburbs	1,035,664	Orel	69,858
Warsaw	638,208	Kherson	69,219
Odessa	405,041	Vitebsk	66,143
Lodz	315,209	Yekaterinodar	65,697
Riga	256,197	Zhitomir	65,452
Kiyev	247,432	Revel	64,578
Kharkov	174,846	Libau	64,505
Tiflis	160,645	Belostok	63,927
Vilna	159,568	Namangan	61,906
Tashkent	156,414	Penza	61,851
Saratov	137,109	Yelisavetgrad	61,841
Kazan	131,508	Cronstadt	59,539
Yekaterinoslav	121,216	Kremenchug	56,648
Rostov-on-the-Don	119,889	Tsaritsyn	55,967
Astrakhan	113,001	Yekaterinburg	55,488
Baku	112,253	Samarcand	54,900
Tula	111,048	Ivanovo-Voznesensk	53,949
Kishinev	108,796	Berdichev	53,728
Nizhnii-Novgorod	95,124	Tver	53,477
Nikolayev	92,060	Poltava	53,060
Samara	91,672	Kursk	52,896
Minsk	91,494	Tomsk	52,005
Voronezh	84,146	Novocherkask	52,005
Kokan	82,054	Taganrog	51,965
Kovno	73,543	Irkutsk	51,434
Orenburg	72,740	Sevastopol	50,710
Dvinsk (Dunaburg)	72,231	Lublin	50,152

MEANS OF TRANSPORT IN 1896.

	European Russia.[1] Miles.	Asiatic Russia. Miles.	Total Miles.
Railways	29,300	5,300[2]	34,600
Waterways (total)	48,000	52,000	100,750
„ nav. for steamers	17,000	30,000	47,000

SHIPPING TRADE OF CHIEF PORTS

(in million tons of merchandise).

Port.	Foreign Trade. Imports.	Exports.	Total.	Coasting Trade Total.
Odessa	0·35	2·60	2.95	1·82
St. Petersburg and Cronstadt	1·93	1·02	2·95	0·17
Riga	0·44	1·13	1·57	0·24
Nikolayev	0·02	1·36	1·38	0·09
Libau	0·20	0·80	1·00	0·12
Batum	0·09	0·81	0·90	0·27
Rostov	0·01	0·74	0·75	0·26
Sevastopol	0·01	0·52	0·53	0·11
Novorossiisk	0·01	0·50	0·51	0·11
Taganrog	0·02	0·45	0·47	0·04

[1] Including Finland.
[2] To this should be added 1,600 miles of the Siberian railway in Chinese territory.

ANNUAL TRADE OF RUSSIAN EMPIRE

(*in millions of rubles*).

	1885–89.	1890–94.	1895.	1896.
Exports	634·8	628·6	689·1	668·7
Imports	415·9	436·2	526·1	540·2
Difference	218·9	192·4	163·0	128·5

ANNUAL TRADE OF RUSSIA

(*in pounds sterling, approximate*).[1]

	1871–75.	1881–85.	1891–95.
Imports	52,000,000	55,000,000	46,900,000
Exports	60,000,000	58,000,000	62,800,000

PERCENTAGE COMPOSITION OF SPECIAL EXPORTS.

	1885–89.	1890–94.	1895.	1896.
Food Products	60·2	57·0	56·8	55·6
Raw Materials	34·6	37·7	37·8	37·4
Animals	2·1	2·2	2·3	2·2
Manufactures	3·1	3·1	3·1	1·9

RUSSIAN TRADE WITH OTHER COUNTRIES

(*in millions of rubles.* 1896).[2]

Countries.	Exports.	Imports.	Total Trade.	Countries.	Exports.	Imports.	Total Trade.
Germany	184·0	190·2	374·2	Finland	17·7	20·5	38·2
United Kingdom ..	160·9	111·3	272·2	Persia	14·5	17·5	32·0
France	58·2	23·4	81·6	Turkey	14·3	6·1	20·4
Netherlands	70·8	5·8	76·6	Egypt	3·8	13·6	17·4
United States ..	1·6	65·7	67·3	Sweden	6·4	5·8	12·2
Austria-Hungary ..	29·9	22·9	52·8	Denmark	9·1	2·3	11·4
China	5·4	41·3	46·8	Other Countries ..	52·5	53·9	106·4
Italy	36·4	10·0	46·4				
Belgium	23·1	19·5	42·6	Total	688·6	589·8	1,278·4

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[1] The value is calculated at the average rate of exchange for each period.

[2] The ruble averaged 2s. in 1896, hence moving the decimal place one to the left gives the value in pounds, *e.g.*, 184·0 million rubles = 18·40 million pounds.

BOOK II.: ASIA

CHAPTER XXIII.—THE CONTINENT OF ASIA

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Position and Dimensions.—Asia is by far the largest of the continents. Its area, 17¼ million square miles, is more than that of the whole of the New World, and includes almost one-third of the land surface of the globe. It lies wholly within the northern hemisphere; but its southern point, Cape Buru, at the tip of the Malay peninsula, comes within 90 miles of the equator. Cape Chelyuskin, the northern point, lies nearly half way between the Arctic circle and the North Pole: the direct distance between these extreme points is 5,350 miles. Between Cape Baba, the western extremity of Asia Minor, and Cape Dezhneff (East Cape) on Bering Strait there is a distance of 6,000 miles, and a range of 164° in longitude, corresponding to eleven hours' difference of time. On all sides, except the west, Asia is bounded by the ocean: on the north by the icy Arctic waters, on the south by the tropical Indian Ocean, on the east by the Pacific, whose northern waters are frozen near the shores in winter. On the west Asia is extended into Europe, and it is joined to Africa by the narrow Isthmus of Suez. Yet between Europe and Asia the Aralo-Caspian depression placed the Arctic and Mediterranean seas in free communication in Quaternary times, giving to Asia a more distinct continental individuality than now appears. The continent, as seen on a globe, has a quadrilateral core from which many peninsulas jut out. Professor H. Wagner chooses as the angular points of this core the southern shore of the Yugor Strait, Cape Dezhneff, Canton, and the north-western point of the Persian Gulf. Thus defined the core of Asia forms 80 per cent., and the peninsular part nearly 14 per cent. of the whole surface. The coast line of Asia is 3·2 times the minimum which could circumscribe its area. By this index its coastal development is less than that of Europe or North America, but greater than that of the three southern continents. It is only on the east that the boundaries differ greatly from those of the continent proper. The islands lying in wreaths on the east of Asia outline the eastern margin of the continental block. Those in the south-east form a great archipelago between Asia and Australia, and no definite geomorphological line divides them into an Asiatic and an Australian group. "Wallace's Line," following the

depression which forms the Makassar Strait and runs between Bali and Lombok, is at most a faunal boundary, and is sometimes chosen as the division between Asia and Australasia. But the line of young volcanoes is continuous through Sumatra, Java, the Sunda Islands and the islands between Timor Laut (Tenimber) and Ceram, and can be traced through the Moluccas and Philippines. Thus New Guinea and the Aru Islands are counted Australian, the others west of a line passing east of Timor, Timor Laut, the Kei Islands and the Moluccas are reckoned Asiatic. The islands of Asia, thus delimited, have an area of over a million square miles; and the insular and peninsular parts of the continent amount to one-fourth of the area of the core. In this respect also Asia ranks next to North America and Europe, and comes before the southern continents. These relations, however, depend on a somewhat arbitrary definition of what constitutes a continental core or a coast-line, and are not to be strongly insisted on.

Coasts.—The northern coast lies almost entirely north of the Arctic circle. It is on the whole low and flat, running out in the Taimyr peninsula to the most northern point, Cape Chelyuskin. The great estuaries of the Ob and Yenisei open in the western part of this coast, which is here penetrated by fjords and fringed with islands, and according to Nansen, shows every evidence of having been glaciated. The island of Novaya Zemlya encloses the Kara Sea which has a bad reputation for ice, but has recently been crossed every year by ships seeking the Yenisei during the few weeks when the ice is broken up. East of the Taimyr peninsula the rivers form great deltas contrasting with the estuaries on the west, and indicating that the land has long been stationary with regard to the sea-level, not subsiding as in the west. Nordenskiöld alone has sailed round the north coast of Asia, and his name is perpetuated in the Nordenskiöld Sea between Taimyr and the New Siberian Islands. West of these islands Nansen let the *Fram* become fast in the ice, and his soundings proved that the Asiatic continental block does not extend far beyond the Siberian coast, and that the Arctic Sea is a depression of very great depth.

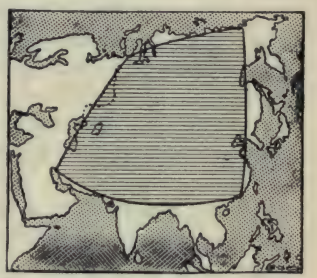

FIG. 223.—*The Continental Core of Asia.*

The north-eastern peninsula of Asia reaches within 36 miles of the north-western peninsula of North America, from which it is separated by the shallow Bering Strait. The northern part of the Bering Sea, between Kamchatka and Alaska, is also very shallow. Thus the Arctic and Pacific basins are clearly separated, and in this region land communication between Asia and America probably existed in the past. There are two eastern coasts to consider, that of the continent itself, and that of the fringing islands on the edge of the continental block. Both are as a rule

irregular and steep, showing evidence of being sunken coasts except where the great rivers have built vast deltas, the flat shores of which have simple outlines. They are not sinking at the present day except perhaps in eastern China. The inner coast has a north-east to south-west trend, and projects southwards in the volcanic Kamchatkan and mountainous Korean peninsulas whose southern ends approach the outer fringing islands. The islands of Sakhalin and Formosa are other links by which the outer island groups approach the continental shore. Four fringing seas lie between these peninsulas and islands, each bounded to the east by a loop of the island wreath. In the north the Sea of Okhotsk is bordered by the Kuriles, further south the Japanese Islands mark off the Sea of Japan, next the East China Sea is defined by the Luchu Islands, and in the south the South China Sea is bounded by the Philippines and Borneo. The northern part of the shallow East China Sea between Korea and the mainland is called the Yellow Sea. Its western shores are formed by the low deltaic plain of the Yellow River (Hwang-ho), which carries down the yellow earth that gives the name both to the river and to the sea. The rocky Shantung peninsula rises like an island above the level alluvial land, and projects eastwards forming rocky coasts with good harbours, and cutting off the Gulf of Pechili from the Yellow Sea. A similar inner gulf is cut off from the East China Sea by the mountainous island of Hainan. The south-eastern margin of the continental block towards the Pacific follows the Philippines and the Moluccas, and within it lie the fringing seas of Sulu and Celebes. The bold convex arc of the Sunda Islands and their northern prolongation in the Nicobars and Andamans towards the Indian Ocean enclose the fringing seas of Banda, Java and Andaman. Borneo and Celebes are the largest islands lying between the two sets of fringing seas; and the south of the South China Sea might be regarded as a midland or mediterranean sea. The south-eastern, or Indo-Chinese, peninsula of Asia ends in the long narrow Malay peninsula, which is only 45 miles wide at the Isthmus of Kra, where a ship canal would greatly shorten the voyages from western to eastern Asia. The gulfs of Siam in the east and of Martaban in the west, are alike in having the rapidly growing deltas of great rivers at their head.

Asia projects into the Indian Ocean in two massive peninsulas, the Dekkan and Arabia, which are not fringed by islands, but rise with terraced sides from the coastal plain, which is usually narrow. The triangular Dekkan with its severed southern portion, the island of Ceylon, still nearly united by Adam's Bridge, lies between two wide round-headed gulfs, the Bay of Bengal and the Arabian Sea. The rectangular Arabian peninsula, on the other hand, is defined by the narrow rifts of the Persian Gulf and the Red Sea, the former silted up by the sediments of great rivers, the latter of great depth and terminated in one arm by the narrow sandy Isthmus of Suez across which a ship canal has been cut to the Mediterranean. The other arm runs, as the Gulf of Akabah, in the line of

the great Dead Sea rift; and between the two the rocky Sinai peninsula rises. The entrance to the Persian Gulf is through the shallow and narrow Strait of Ormuz, that to the Red Sea through the narrower if less shallow Strait of Bâb el-Mandeb.

The plateau of Asia Minor projects westwards and sinks abruptly to the Mediterranean and Black Seas. In the west the indented ria-coast is fringed by many picturesque islands which unite with those of the Balkan peninsula to form the Greek Archipelago. The Sea of Marmora, joined to the Ægean by the Dardanelles and to the Black Sea by the Bosporus, serves as the historic dividing line between Europe and Asia.

Surface and Chief Divisions.—Asia is divided into four great natural divisions, each of which has marked physical characteristics.

(1) *The Northern Lowlands*, a vast plain rising gradually to the south and to the east. One quarter of the continent is less than 600 feet above the sea-level, and by far the greatest part of this is in the north. These northern lowlands are continuous and homologous with the northern plains of Europe, and together they form the Old World Lowland Area.

(2) *The Central Mountains*, a band of lofty folded mountains and plateaux widening to the east and running from west to east across Asia. More than one-twelfth of the continent lies above 10,000 feet, and most of the elevated land is in this mountainous region, which is continuous and homologous with the folded mountains of Europe, and together they form the Old or Mid-World Mountain Area.

(3) *The Southern Tablelands* of the Dekkan and Arabia are table-lands and not folded mountain regions, with little land over 6,000 feet. They form the north-eastern outliers of the great Indo-African or Old World Tableland Area. They are separated from the rest of Asia by the low Indo-Gangetic and Mesopotamian flood plains, and from the African portion of the Old World Tableland by the rift valley of the Red Sea.

(4) *The Eastern Volcanic Mountains*, a belt of mountains bordering the eastern and south-eastern edges of the continental block, and rising as fringing islands above the waters that cover the continental shelf. This region has no exposed plateaux, and is largely volcanic; it forms part of the Pacific Volcanic Area that girdles that ocean. They are separated from the rest of Asia by the eastern fringing seas.

Asiatic Portion of Old World Lowland Area.—The simplest subdivisions of this area in Asia are the river basins, which give five distinct regions, one of inland and four of oceanic drainage.

(1) *Turan*, or the region of inland drainage, mainly to Lake Aral. These plains are covered with wind-blown desert sand, except near the mountains along the river courses and round the lakes, where water-borne deposits of recent origin are found, and in the Ust Urt upland of Teritary rocks between Lake Aral and the Caspian Sea. The surface of the land round the Caspian is below sea-level. In the east the surface rises to the bordering mountains whence the rivers flow. The most

important are the Amu-daria (Oxus) and Syr-daria (Jaxartes) flowing to Lake Aral, and the Ili to Lake Balkhash.

The region of oceanic drainage belongs to the Arctic drainage area and is known as the Siberian Plain. Here, as in the European Lowlands, the main valley-lines (*Thalwegs*) strike from south to north, and are joined by others running mainly from east to west. A generalised section of Siberia from west to east shows a series of very gradual ascents broken by shorter and steeper falls, with the great rivers flowing in the hollows (Fig. 225).

FIG. 224.—*Old World region of Internal Drainage (stippled.)*

(2) *The Ob-Irtysh Region* lies east of the Urals, from whose steep eastern slopes several rivers flow to the Tobol, which lies in the south to north valley-line. The great tributaries all enter from the east. Most of the basin is overlaid with recent deposits, but Mesozoic rocks appear in the lower course of the river south of its great estuary.

(3) *The Yenisei* and its three tributaries—the Lower Tunguska, the Middle or Stony Tunguska, and the Upper Tunguska or Angara—form another great river system. The Angara drains Lake Baikal, a deep and long trough in the crystalline mountains. Most of this basin is a low tableland of Palæozoic rocks, with Mesozoic deposits south of the mouth of the Angara and round its course after it leaves Lake Baikal. Some recent eruptive rocks are found on the Lower Tunguska.

(4) *The Lena Basin* is composed of a similar succession of rocks. Unlike the two western rivers the Lena has no estuary, but forms a great delta where it enters the Arctic Sea. Some of the secondary valley-lines run from west to east. The main river rises *west* of Lake Baikal and does not turn north until near its junction with the Aldan in 130° E.

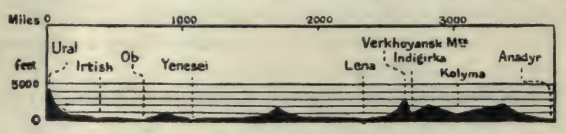

FIG. 225.—*Section across Siberian plain from W.S.W. to E.N.E. about lat. 60° N.*

(5) The extreme *North-East of Asia* forms a distinct region bordered by the Verkhoyansk-Stanovoi heights, composed probably mainly of Palæozoic rocks, which run from the Lena delta to St. Lawrence Island. The Yana, Indigirka and Kolyma are the chief rivers draining this little-known region to the Arctic Sea. During the summer months the great Siberian rivers are navigable, but they possess the great disadvantage of flowing from

warmer to colder climes where the ice covers the sea most of the year. In spring the upper portions of the rivers thaw long before the lower reaches, and great and dangerous floods are consequently frequent.

Asiatic Portion of the Old World Mountain Area.—At first sight the Asiatic mountains seem a complicated and unrelated series of ranges ; but a closer examination shows a certain symmetry that has attracted many students, whose views of their relationship are not always concordant. Professor Suess sees in the region between the Yenisei, near Krasnoyarsk and Chita, east of Lake Baikal, a centre round which the various Asiatic mountain ranges can be grouped from Sakhalin to Java, from the Himalaya to the Persian Gulf, without asserting that this was the centre of action whence these ranges were folded. From the pre-Cambrian to the latest times the same forces have been at work folding the strata along the same lines ; the youngest folds being those at the periphery. Richthofen, Naumann and others have also drawn maps showing the fundamental axes of folding and their relationship to each other. For most purposes it is more convenient to consider the mountains from the centre of the Pamirs, a region separating the lower western ranges and plateaux from the loftier mountains and plateaux of the east. The Pamir region is called by the dwellers there the "roof of the world," and, as the name Pamir really indicates, consists of a series of valleys and ridges. The ridges rise several thousand feet above the valleys, whose floors are at the great average elevation of 11,000 feet above sea-level. From the Pamirs the mountains spread out both west and east. The eastern ranges separate as they pass eastward. The western ranges are drawn together in the Armenian plateau to another node, which is neither so compact, so extensive, nor so lofty. Two very different regions spread longitudinally throughout this vast mountain area ; a northern one of relative depression, a southern one of relative elevation. The Yalta (Crimea), Caucasus, Tian Shan, Altai and Yablonovyi mountains rise steeply from the Old World Lowlands and form the northern ranges of the Mountain Area. South of these lie the hollows of the Black and Caspian Seas with the Kura depression between, and the Kara-kum and Shamo basins, with the Kizil-su valley between.

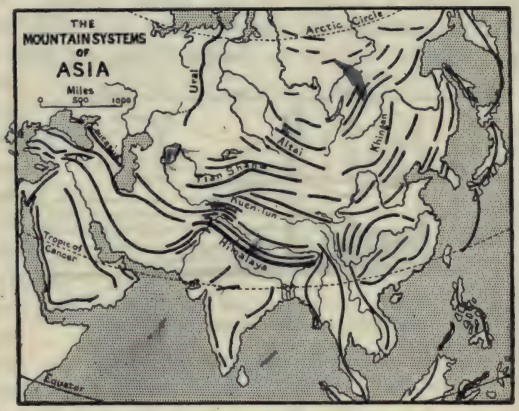

FIG. 226.—*Mountain Systems of Asia.*

The central ranges, Pontus, Elbúrz, Hindu Kush and Kwen-lun, rise steeply from these depressions, but have much shorter slopes on the south to the plateaux of Asia Minor, Iran, and Tibet. These plateaux are bounded on the south by the Taurus, South Persian, Sulaiman, and Himalaya ranges, which have short slopes to the plateaux on the north, but very steep slopes to the flood plains which separate the Old World Mountain Area from the Tableland. Most of these mountains have an axis of Archæan rock with sedimentary strata of different ages, down to the early Tertiary, which were formed before the last upheaval, on either flank. Great glaciers descend from the snow gathered in their loftiest hollows, whence many large rivers flow to southern and eastern seas. The Euphrates and Tigris rise in the Armenian plateau, collecting tributaries from the southern ranges that meet there, and flow to the Persian Gulf, forming the Mesopotamian flood plain. The Indus, Ganges and Brahmaputra carry water from the southern ranges to the Indian Ocean. They make great flood plains which separate the mountain area from the Dekkan. The Salwin and Mekong rise in the east of Tibet, and flow in deep valleys between the three great mountain ranges of the south-eastern peninsula to the sea. The western or Burma-Sunda range passes through Arakan, the Andaman and Nikobar islands, Sumatra, Java, and the smaller Sunda Islands. A minor range separates the river Irawadi from the Salwin, east of which the great Malay range passes from the north along the Malay peninsula. East of this another minor range separates the Menam from the Mekong valley, which is bounded by the Annam range. These mountains are composed of old crystalline and Palæozoic rocks, but the Burma-Sunda range contains abundant recent volcanic rocks and many active volcanoes. South and north of the Kwen-lun, known as the Tsing-ling in China, two great rivers flow from Tibet to the east—the Yangtse-kiang and the Hwang-ho, or Yellow river. South of the Yangtse-kiang is a region consisting of older mountains formed by a succession of faults, and not by folding of the strata, which consist of Palæozoic marine layers and Mesozoic deposits not of marine origin. In the south the land is drained by the Si-kiang or West river and by the Song-ka or Red River of Tongking. The Hwang-ho has cut its channel deep into the loess of northern China, and formed a vast fertile flood plain above the level of which it flows for the last few hundred miles.

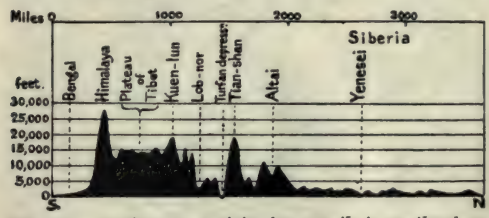

FIG 227.— *Section across Asia from south to north, along the meridian of 90° E.*

Asiatic Tablelands.—Ceylon, the Dekkan and Arabia, differ from the rest of Asia in their geological as well as in their tectonic condition. Old

crystalline rocks predominate; but in the north-west of the Dekkan and in Arabia great flows of recent eruptive materials are found. The Dekkan trap forms a rich hygroscopic soil, especially favourable for cotton cultivation. There are also old sedimentary rocks in this area, which differ from those of the rest of Eurasia by containing a flora, characterised by the fossil Glossopteris, which is related to that found in similar rocks in Australia, South Africa, and parts of South America, thus pointing to geographical changes of vast dimensions since the time when Gondwana-land stretched across what is now the Indian Ocean.

The Eastern Volcanic Mountains are characterised by their young volcanic rocks and the number of still active volcanoes; which stretch from Kamchatka through the Kurile Islands and Japan, through the Philippines, the Moluccas, and the Sunda Islands. Old crystalline and Palæozoic rocks are not wanting; Tertiary and Quaternary deposits are much commoner than those of Mesozoic age. These mountains rise from profound oceanic depths, and over the actic area earthquakes and other seismic disturbances are frequent and often severe.

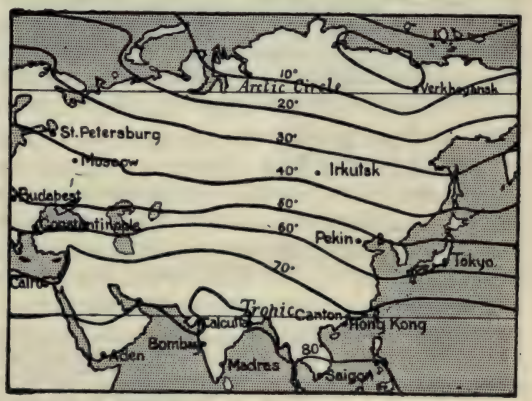

FIG. 228.—*Mean annual isotherms for Asia.* (*After Buchan.*)

Climates of Asia.—The vastness of Asia makes the climate of large areas severely continental, with great extremes of cold in the north and of heat in the south. Only the south and south-east coastal lands have fairly uniform temperatures throughout the year. The mean annual temperature (Fig. 228) corrected for altitude is nearly the same across the whole breadth of the continent in the same latitude; but is somewhat lower on the east coast than in the west. In winter (Fig. 229) this condition remains unaltered in the south; but in the north the air temperature falls from all sides towards a pole of cold in north-eastern Siberia, where at Verkhoyansk, 400 feet above the sea, the mean January temperature is —60° F., a degree of cold unknown in the Polar regions. In summer (Fig. 230) the north of the continent shows a uniform temperature from west to east in the same latitude, but in the south there is a heat centre in north-west India, Baluchistan and Arabia, in which the mean temperature for July exceeds 95° F., and round which less heated air is found on every side. The vast height of the Mountain and Plateau region brings about great local differences of temperature, the temperature of Tibet being always low. The seasonal tempera-

ture changes determine two well-marked pressure conditions—a winter high-pressure system which is most powerfully developed over Mongolia, and a summer low-pressure system which is most intense between the middle Indus and the Gulf of Oman. The winter winds of the continent are consequently outflowing, the summer winds are inflowing. The cold outflowing winds of winter are dry, and over the whole of Asia hardly any rain falls at this season, except in regions where the winds are deflected upwards by mountains, especially after passing over the sea. The Malay Archipelago and Peninsula and Ceylon, as well as the extreme south of the Dekkan, are near enough the equator to have the double rainy seasons characteristic of sub-equatorial regions. The rest of the continent receives rain from the inflowing winds of summer, and these fall most heavily where the course of the surface wind is normal to that of the great mountain ranges, *e.g.*, the western mountains of the Dekkan and Burma, and the eastern ranges of the east coasts. Local topographical variations deflect the rain-bearing wind; and thus the southern slopes of the Himalaya and of the Khasia Hills receive abundant rains. Only the interior regions, shut off from oceanic influences by very high mountains, have little or no rain in summer, and are in consequence deserts.

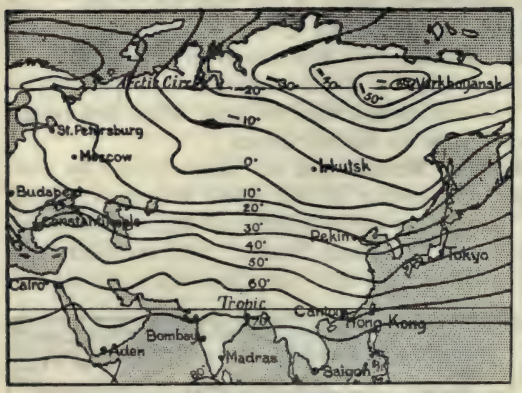

FIG. 229.—*January isotherms for Asia.* (*After Buchan.*)

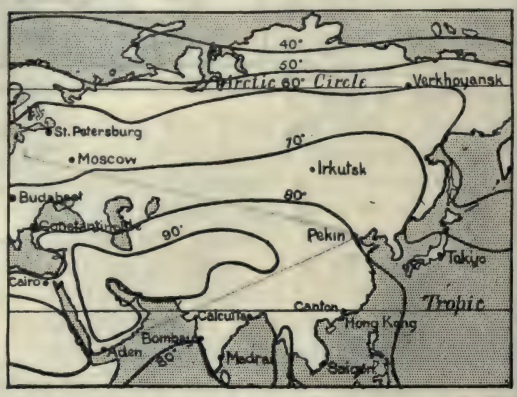

FIG. 230.—*July isotherms for Asia.* (*After Buchan.*)

Climatic Areas.—Asia may be divided into five great climatic areas—(1) *The Arctic Cold Dry Area*, with a mean temperature not exceeding 50° F. in the warmest summer month, and a mean rainfall never over 1 inch in the wettest month. This is a small region almost entirely within the Arctic

circle. (2) *The Siberian or Temperate Continental Area* has great severity of winter cold, but the summer temperatures range from 50° to 70° or 75° F. The temperature extremes are greater in the east than in the west. Hardly any rain falls here in winter, but in the short summer a mean monthly fall of from 1 to 2 inches is observed. (3) *The Central* or *Arid Area*, including Arabia, Iran, Turan, Taklamakan and Gobi, is one of varied elevation and of varied temperature conditions. Most of it is very dry, but slight winter rains characterise the west, whereas what precipitation occurs in the east falls mainly in summer. The extreme south of Arabia is also a region of summer rains. This area exhibits in a high degree the desiccation characteristic of the central plateaux of great mountain ranges. The arid basin of Taklamakan, for example, abounds in ruined cities of a time when rain must have been abundant, land fertile, and population dense. (4) *The Monsoon Area* includes India, Indo-China, and the eastern coastal lands, where rain falls when the inflowing summer winds blow. The south of this area is much warmer and more equable in temperature than the north, where cold winters are the rule. The regions within this area which have winter rains are the south-east of India, and of Indo-China, and the west of Japan. The monsoon winds set in and cease at different times in different parts of the area. During their prevalence the atmospheric conditions remain relatively steady, but at the periods of change they are very unstable, giving rise to the dreaded cyclones of the Indian Ocean, and the typhoons of eastern waters, which often do great damage both on land and to ships at sea. (5) *The Sub-equatorial Area*, characterised by two rainy seasons, is always warm and always wet, so that we should speak of its possessing two less wet rather than two dry seasons in the year.

Minerals and Soils.—The mineral wealth of Asia is very great. The precious stones and metals have long been famous: the diamonds anciently cut and sold at Golconda, the Ceylon sapphires, the Burma rubies, the jade of Turkestan, and the gold of the Caucasus and of Japan. Gold is found in the Ural, Altai, and the mountains of the north-east, and this gold zone probably extends across the Pacific to the Yukon region. These mountains are also all rich in many other minerals, and so are the mountainous provinces of China. The tin of the Malay peninsula, the copper and mercury of Japan, the silver, copper and graphite of Siberia, the rock salt of India and the salt in the dried up lakes of the deserts may be mentioned as useful minerals already largely utilised. Iron is found in many regions, but is little worked by modern methods. Rich petroleum wells occur in the Caucasus, Burma, and Sumatra; and the immense coal-fields of China, and some of the eastern islands, including Sakhalin, Japan, and Hainan, which are hardly yet used, lock up vast stores of wealth.

Large areas of northern Asia are enriched with loam. Much of the dry centre is covered with wandering sand dunes, beyond which the fine loess is blown over vast tracts of land which are highly fertile where water also exists. The Indian and Indo-Chinese peninsulas have a

surface of laterite, a clay rich in iron formed in warm, wet, tropical regions. The flood plains of the great rivers are covered with a fertile alluvium whereon rich crops are grown.

Northern Vegetation Zones.—The soils determine three great floral areas. The *glacial* or *fluviatile soils* of the north and east support forests, the *œolian soils* of the centre and south-west are steppe lands or deserts, and the *laterite* regions of the south and south-east are wooded. But the climate is the chief factor determining the distribution of the different plant associations; and the three great typical soil areas, which are themselves largely conditioned by climatic factors, can be subdivided into smaller districts with different types of vegetation. In the Arctic climate area only the surface of the soil is thawed during the brief summer, and it is a frozen desert most of the year. Here no trees can grow, and the plant association is termed *Tundra;* the vegetation includes low shrubs of birch, willow, larch, spruce, and other plants that are trees in better conditions, and berry-bearing bushes such as the cranberry; but the most characteristic plants are lichens and mosses. During the brief summer poppies, saxifrages, and many of the plants found on European mountains burst into a brief season of bloom, when the land is gay with many coloured flowers. The Siberian climate area where loam exists is a land of *Forests.* The typical plants associated together are coniferous, the larch (*Larix Siberica*) and firs (*Abies Siberica*) predominating; but birches, poplars, and other trees familiar in temperate Europe abound. The forests can be traced farthest north along the river valleys. In the south the deciduous trees become more abundant, and alter the aspect of the forest; and still farther south a belt of birch woods forms the transition from forest to steppe land. The forests are thick and in many places impenetrable. Brehm has given a vigorous description of the forest primeval, with its contrasting glades of living trees and thick underwood of clematis, rhododendron and honeysuckles, climbing over dead, fallen and rotting trunks. Meadow lands with bright summer flowers exist in the Siberian area, and predominate in the rich grass steppes further south. Towards the east the proportion of European species in the forests diminishes, and in the Amur basin comes to a minimum, while Chinese and Japanese species increase in number.

Steppes and Deserts.—The dry conditions which permit the transference and accumulation of wind-blown soil militate against the development of large trees. The loose porous soil and the extremes of heat and cold serve to promote a rapid growth of grasses and other annuals during the short moist season, but these perish even more quickly than they rose, and are preserved until the next moist season by their hardy seeds or roots. The *Steppe* lands are of two kinds, grass steppes bordering the forests, and poor steppes passing into sterile deserts. The grass steppes of south-western Siberia lie between 50° and 55° N., and reach as far east as the Ob. Similar steppes exist east of the Altai and south of the Sayan and Yablonovyi mountains, in the upper valleys of the great rivers

rising in eastern Tibet, at the base of the mountains enclosing the Tarim basin, rising from Turan and in the south-west of Iran. The snows of the high mountains are a source of water for these steppes; and where perennial streams flow, rich oases are formed along their courses. The irrigated regions yield fine fruits, vegetables and cereals. Poor steppes are found round the true desert regions, and all steppes may be divided by their relation to the three low and the three lofty areas of inland drainage—(1) The *Turanian* or Caspian-Aral-Balkhash region passes from salt desert through poor steppe with saxaul (*Borsczowia aralo-caspica*) to the mountains, round which are fertile regions watered by the rivers. (2) The Taklamakan or *Tarim* region has much the same characteristics, the saxaul being the typical plant. (3) The *Gobi* or Mongolian region where grasses live, but hardly a bush is to be found. (4) The *Arabian* region is a continuation of the Sahara, with date-palm oases. (5) The *Anatolian* and *Iranian* desert regions have few plants, some, such as the *Astragalus Tragacantha*, yielding gum tragacanth; and (6) the *Tibetan* region has a desolate tundra-like appearance, with coarse grasses and a few stunted trees in the less elevated parts. The moister sides of the mountains rising out of the steppe land may be wooded, but the vegetation in most places passes from rich grassy steppe to poor steppe, and gradually into tundra just under the snow line.

Warm Zone.—In the north of the Warm Zone we find the *Subtropical Forest Area*, the western region of which has winter, and the eastern region summer rains. The Western or *Mediterranean* region, yields olives, figs, pomegranates, Aleppo pines, cedars, myrtles, evergreen oaks, and other trees on the lower mountain slopes, and Oriental planes higher up. The Eastern or *Sino-Japanese* region has tea trees, camellias, and rich flowers, many of which, grown in European gardens, may be recognised by their specific names *sinensis* or *japonica*. The upper slopes of the mountains of Japan and Korea are covered with beeches and conifers such as *Fagus Sieboldi* or *Abies Firma*. The *Savanna* area of Asia is found in the south of Arabia, in India, Indo-China, and the higher parts of Ceylon and the Malay Archipelago. Southern Arabia forms part of the African savanna area. The other regions may be grouped as the south Asiatic savanna area, and they are characterised by great grasses such as the alang-alang (*Imperata cylindrica*). The moister lower regions of southern and south-eastern Asia contain dense *wet jungles*, with a rich vegetation consisting of giant banyans, screw-pines, lofty palms, and other great trees, up which innumerable creepers climb to the light above, while saprophytic and other orchids, lycopods and mosses live in their branches. The mountain slopes above the plains are also covered with great forests, with sal and deodar in the Himalayas, and teak in the Dekkan and Burma, and areca palms in the Western Ghats, and the Malay peninsula and islands south of 10° N., while *liquid amber* grows on the middle slopes of the mountainous Sunda Islands. The tropical growths flourish to nearly 3,000 feet above sea-level and then give

place to sub-tropical and temperate plants, the last disappearing above about 12,000 feet.

Economic Plants.—The rich flood plains and deltas of the great rivers of southern and eastern Asia are among the most fertile regions of the world. They yield rich crops of rice, sugar-cane, cotton and indigo ; while in the drier regions wheat may be grown in irrigated districts. Coco-nut and sago palm, tamarind and bread-fruit are grown in the south-eastern islands, where spices, such as pepper, nutmeg, clove and vanilla are found. Most of the common cereals, wheat, barley, rye and oats, have long been cultivated in western Asia, where date-palms grow in the oases of the deserts, and olives, vines, figs, pomegranates, oranges, and other fruits flourish round the Mediterranean. In Arabia coffee is cultivated, and also in southern India, where cacao has recently been introduced. Cinchona is grown in the south and south-east, yielding the anti-febrile quinine. In the far east tea, rice, cotton, sugar, lac, are among the chief economic plants, and in recent years the cultivation of tea has spread from China to India and Ceylon.

Fauna.—Tundra, temperate forest, steppe, desert, savanna, and wet jungle, each contains its own association of animals whose habits are adapted to their surroundings. The lack of barriers in northern Asia gives a certain unity to the fauna over this vast area, but the lofty mountains and wide deserts form impassable barriers to most forms, so that different faunal realms exist in the north and in the south. The extreme south-west shut off by desert, and the south-east with its isolating seas have each animals of different type from those of the north and south. North of the southern mountains the animals belong to the Palæarctic realm ; in India, Indo-China, and the adjacent islands to the Oriental realm. The south of Arabia is African in faunal as well as in physical characteristics, and the islands east of Wallace's line are Australian rather than Asian in type. The tiger ranges over the greater part of the south and east of Asia, and, with the elephant and rhinoceros, may be looked upon as typical of the southern part of the continent. The wild horse and camel feed on the steppes of central Asia, and huge mountain sheep (*Ovis argali* and *poli*) are well known as game on the Pamirs. Most of the domestic animals of the world are of Asian origin. The reindeer is the draught and milk-giving animal of the Tundra. In the Tibetan cold and desert regions the yak is as important as the reindeer is in the north. The camel serves man in the great desert regions, round whose outskirts horses are the most important animals belonging to the nomad, and with his herds of cattle, sheep and goats, constitute his wealth. In many western regions the donkey of a fine breed is invaluable, and mules are common. The Indian buffalo is a draught animal, but in India, as in China and Japan, where the land is fertile, it is too valuable for grazing, and few animals are kept, save pigs and fowls, for which there is plenty of food, and which yield the fat and nitrogen so often lacking in a vegetable diet. In India and Indo-China the elephant has been tamed, and performs many transport services. The great aquatic mammals are hunted

in Polar seas for skin and oil and bone, and the pearl oyster is brought up by divers from the bottom of tropical waters.

People.—The more important groups of the White race represented in Asia are the Semitic type of Syria and Arabia, the numerous tribes of the Caucasus, the Slavonic people pressing eastwards across Siberia and in Turan, and the Aryan people of Iran and northern India. The Yellow or Mongolian type is the most numerously represented in Asia, and includes two-thirds of the inhabitants. The northern Mongoloids speaking polysyllabic languages may be distinguished from the southern Mongoloids using so-called monosyllabic tongues. Among the former are the various Finno-Tatar and Turki-Tatar races of the northern and of central Asia, the true Mongolians, and the Manchus, all of whom may be grouped as Ural-Altai Mongols, and are to be distinguished from the Koreans as well as from the Japanese. The southern Mongoloids include Chinese, Tibetans, various Himalayan hill tribes, Burmans, Siamese and Annamese. The relationships of the north-eastern tribes, sometimes called hyperboreans or Bering tribes, are not well known. The Black type is represented in the south by the negroid Dravidians of the Dekkan and Ceylon, who are quite distinct from the Negritos of the Malay Peninsula and Archipelago. These have been pushed into the interior by the Malay races who occupy the coasts and favourable places; and have probably a large proportion of Mongoloid blood.

Occupations.—By far the greatest part of Asia is occupied by many nomadic tribes, relatively few in individuals when compared with the mass of settled inhabitants of the Indian and eastern plains. The northern and north-eastern tribes are hunters and fishers, and in so far as they rear reindeer, are also pastoral. Pastoral nomads occupy the rest of the continent that is not cultivated. Agriculture is carried on in Asia Minor and Mesopotamia, along the river courses and on the oases of central Asia, in southern Siberia, and down the Amur, including the region north of Vladivostok, in Korea, southern Manchuria, northern China, the Dekkan, and the Upper Ganges and Indus flood plains. The soil is so carefully cultivated in Japan, and most of China-proper, that we may call these regions gardens. There also manufactures of all kinds flourish, but as yet the modern factory system of Europe has been introduced into few places in Asia. Tropical plantations exist in south-western Arabia, the Dekkan, Ceylon, Bengal, Assam, Burma, on the flood plains of Indo-China, and the Malay Archipelago. Much of the Malay peninsula and of the islands of the Malay Archipelago is so very fertile that the inhabitants have to do little more than clear the surface of the ground and plant cuttings to obtain good crops. It is natural to find that the south and east are the most densely peopled regions of Asia, and it is estimated that over 830 million people live in India, Indo-China, China, Korea, Japan, and the south-eastern islands, *i.e.*, half the population of the world on one-tenth of its surface. The rest of Asia has only 70 million people, and of it an area half as large as Europe

is practically uninhabited. The total population of the continent is estimated at 840 millions, 55 per cent. of the human race.

History.—The physical configuration of Asia has largely determined its history. On the northern plains the conditions have been unfavourable to the growth or agglomeration of population, and hence to the development of any important civilisation or religion. South of the central barrier of mountains and deserts, three distinct natural areas of favourable conditions have developed characteristic civilisations. Of these the oldest is probably that of Mesopotamia, the rich alluvial flood plain of the Euphrates and Tigris, which has been the seat of a series of important empires, the most ancient, that of Chaldea, reaching back to the dawn of history. Through the narrow strip of Mediterranean coast-line Mesopotamian civilisation influenced the development of Europe, and was influenced by it. An equally opulent and magnificent civilisation grew up on the flood plains of the Himalayan rivers, but the mountain and desert barriers on the north, and the sea on the other side, confined their influence to a more limited area. The third great Asiatic civilisation arose on the flood plains of the Yangtse-kiang and the Hwang-ho, and its records reach back to a remote antiquity. The wealth of all these regions has naturally always exposed them to invasion by attracting the cupidity of the nomads of the steppes, but the progress of barbarian aggression became irresistible, as the gradual dessication of central Asia made it absolutely necessary for the nomads to quit their withering pasture grounds. This drying-up of central Asia is probably the ultimate explanation of such great events in the world's history as the successive Mongol conquests of China, the Mongolian settlement of the Russian plains and Hungary, and the downfall of the Roman Empire. Even India, with its almost impenetrable barriers of mountain and desert, was attacked. The last great pastoral invasion of the west, which made the fairest part of western Asia and the eastern capital of the Roman world the prey of the Ottoman Turks, took place less than 500 years ago, and even as late as the seventeenth century the expansion of the Turkish Empire was a menace to Europe.

While Asia has thus expanded into Europe, influences have been at work in the opposite direction. What was first prompted by the ambition of individual conquerors, from Alexander onwards, is now the outcome of the economic conditions of Europe, and has become the settled policy of its Great Powers. Greek and Roman civilisations succeeded each other in Asia Minor, but until modern times no western Powers penetrated much further. The ancient Armenian nation subjugated by the Turks, has maintained its religious faith and its national character, though its territory is parted between three empires. The development of sea power afforded a new means of aggression, and helped to shorten distance. Portugal, Spain, Holland, France and the United Kingdom all founded empires in eastern Asia. Little remains of Portuguese and nothing of Spanish possessions in the east, but the Dutch still hold most of the Malay Archipelago. India was

subjected from the sea by the French, and then by the British, who have welded the isolated States into an empire, and control the key positions on the routes both to east and west. France has conquered a new empire in the south-east and has interests in China, where Germany and Russia have also obtained a footing. The British colonies of Straits Settlements and Hongkong are bases from which a vast commercial interest in China has been developed. These conquests, however, are mainly military, or at best commercial, *i.e.*, of the least permanent types. Very different is the steady advance of Russia across the Turanian and Siberian plains, and more recently through Manchuria towards northern China. Here the advance is the pushing onwards of settlers into lands which are as yet sparsely peopled, and in which new routes have opened many regions well suited to the development of the great Slavonic race. Persia, Afghanistan, Siam, and Korea retain a precarious independence through the rivalries of the Powers whose territories border their lands. Japan has attempted to forestall European conquest by copying European civilisation, and has itself adopted a policy of expansion. The application of European capital and supervision, and the introduction of telegraphs and modern means of rapid communication are working an economic transformation in Asia, the outcome of which cannot at present be foreseen. So far it has relieved the pressure of western needs by opening new markets, but as the industrial development of Asia proceeds, the competition must be severely felt in Europe.

As Europe is typically the continent of limited monarchies, Australia that of colonies, and South America that of republics, so Asia may be looked upon as the continent of absolute monarchies, the principle of absolutism is even carried out in the European possessions on the mainland, and in Japan alone is the government limited by a popular constitution.

Religion.—Asia has been the cradle of all the great world religions. In each culture area a great religious type developed. Brahmanism, the dominant religion of India, professed by 208 million people, gave birth to Buddhism, which is the religion of 425 million human beings in Tibet, Mongolia, China and Japan. China, however, produced a religious or moral teacher of its own in the person of Confucius, whose precepts codify the ethics of a patriarchal agricultural people. These religions, like the civilisations with which they are associated, have exercised but little influence on Europe. The centre of influence in both cases lay further west. Judaism, the purest of the Semitic cults, has produced two religions which have radiated respectively west and north and east and south. The older, Christianity, has become the religion of Europeans and their descendants, but has made little progress in Asia, where its adherents do not number 20 millions. The younger, Islam or Mohammedanism, has spread over south-western Asia, and extended eastwards to India, and even to China. It was the motive power which led to the Arab conquests in Asia, in Africa, and even in Europe; to the mediæval Persian empire; and to the Turkish invasions. It was ever a religion of the sword; and its pro

gress is attested by the fact that 160 million Asiatics now profess it. The religions of the northern Asiatic peoples and of the Negroids in the south-east are fetishistic, and have played little part in world history.

Asia, with its vast masses of population remaining passively in the place of their birth, is the one stronghold of the spirit of the past; the great bulk of the people live to-day as they lived when Marco Polo sojourned amongst them, or as they lived a thousand years before; and while the hordes of wandering Asiatics have convulsed the world, and again and again turned the course of history, the stationary mass may still long resist the penetration of European commerce, as it has for many centuries withstood European civilisation and religion.

STATISTICS.

THE CHIEF COUNTRIES OF ASIA.

	Area square miles	Population.
Asiatic Russia	6,394,000	24,700,000
Chinese Empire	4,278,008	400,000,000(?)
Indian Empire	1,800,000	294,000,000
Asiatic Turkey	654,000	17,000,000
Persia	650,000	8,000,000
Dutch East Indies	584,000	34,000,000
Afghanistan	250,000	4,000,000
French Indo-China	256,000	18,200,000
Siam	200,000	9,000,000
Japan	160,000	42,000,000
British Colonies	150,000	5,000,000
Korea	82,000	17,000,000

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CHAPTER XXIV.—ASIATIC TURKEY AND ARABIA

I.—ANATOLIA

By General Sir Charles W. Wilson, K.C.B., F.R.S.

Boundaries and Coast.—Anatolia occupies the westward extension of the Iranian plateau that stretches out like an arm towards Europe. On the north it is bounded by the Black Sea ; on the west by the Bosporus, the Sea of Marmora, the Dardanelles, and the Ægean ; on the south by the Mediterranean, Syria, and Mesopotamia ; and on the east by Russia and Persia. The north coast is rocky, has no good harbours, and only one safe roadstead—Sinope, between the Bosporus and the Russian frontier. There are, however, several open roadsteads and small ports at which steamers ship the produce of the interior. The west coast is deeply penetrated by the waters of the Marmora and Ægean, and some of its inlets, such as the Gulf of Smyrna, form excellent harbours. For several miles it is only separated from Europe by the narrow channels, Bosporus and Dardanelles, that connect the Marmora with the Black Sea and the Ægean. South of the Dardanelles the coast is fringed with islands. The south coast is deeply indented by the broad bay of Adalia, and towards the east its cliffs give way to the low shore of the Cilician plain. East of Cape Alupo are the land-locked harbours of Marmarice and Makri, and further east are small ports at which steamers call. South of Cape Anamur lies Cyprus.

Configuration.—The Anatolian plateau rises from west to east, and attains its greatest altitude, above 6,000 feet, near Erzerûm. On the north it is buttressed by the Pontic coast range, which varies greatly in height, and rises abruptly from the sea. The only coast plains are the deltas formed by the Kizil and Yeshil Irmaks. On the south the plateau is similarly buttressed by the Taurus range, which in places has an altitude of from 7,000 to 10,000 feet. Except where the Pamphylian and Cilician plains intervene, the range approaches the sea. Farther east it is separated from Syria by the gorge of the Jihûn, and breaks down to the lowlands of Mesopotamia in a series of rock-terraces seamed by deep ravines. The western face of the plateau is broken by broad valleys, and only in the case of Olympus (7,600 feet) rises much higher than 2,500 feet. On the east the Anatolian passes into the Iranian plateau.

The Anti-Taurus range, which rises east of Sivas and runs south-west to Mount Taurus, divides the plateau into Western and Eastern Anatolia. In the first the most striking features are the great central plain with its salt lake ; the absence of navigable rivers ; Mount Argaeus (13,100 feet), and the

volcanic district to the south with its rock-hewn houses and underground villages; the subterranean flow of streams beneath the Taurus; the picturesque lake district east of Dineir, and the number of hot medicinal springs. In Eastern Anatolia, elevated plains are separated by mountain ranges that run from east-north-east to west-south-west. The principal features are the fertile volcanic district of Van, with its salt lake (area 2,000 square miles, altitude 5,300 feet), and the old craters Sipan Dagh (12,000 feet) and Nimrud Dagh; the lofty Bingeul Dagh; snow-capped Ararat (17,160 feet), and the wild gorges through which the waters of the Euphrates and Tigris find their way to lower levels. The Pontic coast range, the plateau, and the Taurus are here roughly distinguished as Lazistan, Ermenistan, and Kurdistan—the countries respectively of the Lazis, the Armenians, and the Kurds. Kurdistan includes also the mountainous district, east of Mosul, through which the two Zabs run to the Tigris.

Some of the Anatolian rivers are of considerable size. From the high plateau of Eastern Anatolia the Choruk Su (*Acampsis*) and the Yeshil Irmak (*Iris*) run to the Black Sea, and the Euphrates and Tigris, after reaching the lowlands of Mesopotamia, flow through them to the Persian Gulf. From the plateau of Western Anatolia the Kizil Irmak (*Halys*) and the Sakarîa (*Sangarius*) flow to the Black Sea, and the Gediz Chai (*Hermus*) and Mendere Chai (*Mæander*) to the Mediterranean. The Geuk Su (*Calycadnus*), which rises in the Taurus range, and the Sihûn (*Sarus*) and Jihûn (*Pyramus*), which rise in the recesses of Anti-Taurus, also discharge their waters into the Mediterranean.

The great plain of Western Anatolia is composed of lacustrine deposits of the Tertiary period. Mount Taurus consists chiefly of Cretaceous limestone, the Pontic range of schists and metamorphic rocks. Igneous rocks of the Tertiary and later periods occur in many districts, and some of the minor ranges are of granite. The mineral wealth is great, but neglected; it includes gold, silver, lead, iron, coal, boracite, chrome, fuller's earth, rock-salt, alum, kaolin, antimony, emery, and meerschaum. Serpentine and fine marbles are found in several localities. Anatolia is subject to earthquakes of great severity.

Climate, Flora, and Fauna.—On the north coast summers of damp, enervating heat are followed by cold winters with much rain and heavy falls of snow. On the plateau the summer is hot and the winter very cold, in Eastern Anatolia often reaching —15° or —20° F. On the south and west coasts the winter is mild and the summer heat is tempered by sea breezes. Malaria is prevalent in some localities.

The Pontic range is clothed with magnificent forests of oak, fir, and beech, and on the higher slopes rhododendrons and azaleas flourish. On the ranges to the south, including the Taurus, there is less variety of foliage in the forests. There is excellent wheat land on the plateau, and various districts, according to climate, favour the growth of the vine, olive, fig, orange, lemon, apple, pear, maize, rice, opium, cotton and liquorice. The

central districts are almost treeless, and, as a rule, dreary and uninviting; but where the rivers break through the coast ranges the scenery is sometimes grand, often picturesque, and occasionally of rare beauty.

Bear, panther, lynx, wolf, hyæna, wild boar, chamois, ibex, moufflon, deer, gazelle, bustard, francolin, pheasant, swan, pelican, and stork are found. Trout abound in the mountain streams, and a species of herring is caught in Lake Van. Wiry horses and excellent mule camels [1] are bred on the plateau, which is also the home of the Angora (mohair) goat.

History.—Geographical position, close proximity to Europe, the absence of navigable rivers, and the few approaches to the plateau from the coast, have had an important influence on the history of Anatolia. The earliest routes to the East passed through it, and it has ever been the scene of an unending struggle between the influences of the East and West. Although kingdoms (Phrygia, Lydia, Pergamum, Pontus, Armenia and Seljûkian Rûm) have from time to time risen within its borders, it has never been the seat of permanent empire. At two periods—when Greek colonists, and later when Genoese and Venetians occupied the islands and ports of the coast, and grew rich as "middlemen" between the East and West—the history of the maritime districts had little in common with that of the plateau.

In the dawn of history Anatolia was occupied by non-Aryan races. Such were the "Hittites," whose capital was at Boghaz Keui, and the people of Biainas who dwelt at Van. When the Aryan immigration commenced is unknown, but in the western districts there must have been a great fusion of blood several centuries before the Persian conquest (B.C. 546). In the east the Armenians displaced the people of Biainas in the seventh century B.C. Alexander destroyed the Persian Empire (B.C. 334–331), and under his successors Greek culture and the Greek language prevailed amongst natives of the higher class. But western civilisation made little progress in the interior until the Roman period, and the most efficient agent in diffusing it was Christianity. Under the Roman emperors western Anatolia was Europeanised, whilst, after years of strife, all east of the Euphrates became a Persian province. The Arabs made predatory incursions (A.D. 661–867), but, except in Armenia, obtained no real hold of the country. The advent of the Seljûk Turks (A.D. 1071) initiated a long period of decay. For four centuries wave after wave of nomads —Turks, Mongols (1235), Timur and Tatars (1386–1402)—swept over the country and destroyed its prosperity and wealth. Constantly on the move in search of fresh pasture for their flocks, despising agriculture, caring nothing for town life, and heedless of the morrow, they rendered cultivation impossible, and forced the peasantry to become nomad or seek refuge in the mountains. From these disasters Anatolia has never recovered, and recolonisation from Europe can alone restore its pristine prosperity.

[1] Bactrian sire, Arab dam.

People.—The present population is partly sedentary, partly nomad ; partly Moslem, partly Christian. The sedentary inhabitants represent on he whole the races that occupied the country when the Seljûks first appeared on its borders. The Moslems are the descendants of those who changed their faith, the Christians of those who retained it. *Turks* whose ancestors settled in the towns and villages are met with throughout the country, and in some localities there are Turkish villages. *Kurds*, sedentary and nomadic, are widely spread. Their principal home is in the mountain tract called Kurdistan, which they have occupied from a remote period. They are of Median origin, and speak Kermanji and Zaza, two Persian dialects intermixed with Syriac and Armenian words. *Lazis*, who belong to the Caucaso-Tibetan race, and speak a language allied to Georgian, live in the coast range east of Trebizond. In western Anatolia there are large *Circassian*, *Tatar*, and *Bulgarian* colonies. *Greeks* are in a majority in the islands and on the west coast ; and in Cappadocia and the Pontic coast range there are large Greek-speaking communities. In the isolated villages on the plateau the Greeks only speak Turkish. *Armenians* are found in all Anatolian towns, but there are few Armenian villages west of the Sivas and Adana vilayets. In certain districts of eastern Anatolia they form a majority of the people, and occupy the towns and high-lying valleys. The language is Armenian, but in isolated villages the peasants only speak Turkish or Kermanji. *Nestorians* live in the valleys of the Great Zab and Bohtan, near the Persian frontier. They speak a dialect of Syriac, containing Persian, Arabic, and Kurdish words, and are the descendants of Syrian Christians driven to the mountains from Mesopotamia by the encroachments of the nomads. The *Turkomans*, *Tatars*, *Avshars*, and *Yuruks*, who are widely distributed, are nomads of Turk or Mongol origin.

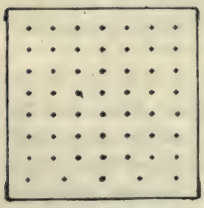

FIG. 231.—*Average population of a square mile of Anatolia.*

The Moslems are either Sunnis or Shias, the former being in a large majority. The Christians belong either to the Greek Orthodox, the Armenian Gregorian, the Nestorian, the Protestant, or the Roman Catholic Church. All non-Moslems must belong to one of the recognised religious communities (*millets*), each of which has two representatives on the Council of State at Constantinople. Education is backward amongst Moslems ; but the Christians have latterly made great progress with the assistance of colleges and schools established by the American Missions.

Trade and Communications.—Most of the people make their living by agriculture, which is in a backward state. Large numbers are, however, employed in the various mines and industries in the interior, and as sailors, and in the sponge and other fisheries on the coast and in the islands. Silks, cotton stuffs, mohair cloth, carpets, sweetmeats, wine, soap,

liquorice paste, and copper utensils are largely manufactured. The principal imports are textile fabrics, iron, coal, petroleum, and sugar. The exports are raisins, figs, wine, liquorice, wheat, olive oil, opium, drugs, gum tragacanth, raw silk, cocoons, mohair, wool, carpets, beeswax, tobacco, sponges, hides, valonea, yellow berries, boxwood, timber, meerschaum, metals and ores. Austrian, French, Greek, and Russian steamers call at the various ports, but most of the foreign trade is done with the United Kingdom.

During the Roman period Anatolia was intersected by well-kept roads; but with the advent of the nomads wheeled transport disappeared and camels and mules became the common means of transport. The roads were neglected, and it is only during the last thirty years that any attempt has been made to improve them, introduce carts, and make railways. One line of railway, which it is proposed to continue to Mesopotamia, runs from the Bosporus to Ismid (*Nicomedia*) and Eskishehr (*Dorylæum*), whence one branch goes to Angora (*Ancyra*), and another to Konia (*Iconium*). Other lines run from Mudania to Brûsa; from Smyrna to Manisa (*Magnesia*) and Alashehr (*Philadelphia*), with a branch to Ak-Hissar (*Thyateira*) and Soma; from Smyrna to Ephesus, Aidin (*Tralles*), and Dineir (*Apamea*), with short branches to Denizli and Chivril; and from Mersina to Tarsus and Adana. Most of the railways are in the hands of German capitalists.

FIG. 232.—*Anatolian Railways*

Divisions and Towns.—Turkey in Asia is divided into provinces (*vilayet*) governed by valis who are appointed by the Sultan. Each vali has a staff of civil servants, and is assisted by an administrative council on which the spiritual heads of the non-Moslem communities have seats. For administrative purposes each vilayet is divided into districts (*sanjak*), sub-districts (*kaza*), communal circles (*nahieh*), and communes (*karieh*), governed respectively by mutessarifs, kaimakams, mudirs, and mukhtars. Justice is administered in accordance with the common law (*nizam*), by civil, criminal and commercial provincial courts, from which there is a right of appeal to the High Court at Constantinople. In Anatolia there are fifteen vilayets, two separate sanjaks, and one principality (Samos). Amongst the towns *Trebizond* (*Trapezus*) on the Black Sea, the capital of the old empire of Trebizond, is the natural trade outlet of Erzerûm and northern Persia, but Russian railways are rapidly diverting the traffic. *Samsûn* (*Amisus*), on the Black Sea, exports the produce of the Sivas vilayet. *Skutari* (*Chrysopolis*), on the Bosporus, is a suburb of Constantinople. *Smyrna*, the most important town in Anatolia, and one of the

principal ports of the Ottoman Empire, lies at the head of a deep gulf, and is the natural trade outlet for the western districts. It has direct steam communication with England. *Adalia* (*Attalia*) and *Mersina*, on the south coast, are the ports of the Konia and Adana vilayets. *Brûsa* (*Prusa*), at the foot of Mount Olympus, is noted for the beauty of its situation, its hot iron and sulphur springs, its silk manufactories, and the mosques and tombs of the early Sultans who made it their capital. *Angora* (*Ancyra*), the ancient capital of the Gauls, is celebrated for its fruit, honey, and mohair cloth. It gives its name to the Angora (mohair) goat and Angora cat. *Konia* (*Iconium*), connected with the missionary labours of St. Paul, and later the capital of the Seljûks, lies near the southern edge of the great plain of western Anatolia. *Kaisariyeh* (*Cæsarea*), at the foot of Mount Argæus, whence roads lead by easy passes across the Anti-Taurus, has been a trade-centre from the dawn of history. It is still the most important commercial town on the plateau, and is remarkable for the enterprise of its merchants. *Sivas* (*Sebastea*), in the valley of the Kizil Irmak, is the centre of a rich wheat-growing district. *Erzerûm*, the principal town of eastern Anatolia, is a military station protected by a circle of detached forts. *Van* (*Dhuspas*), near Lake Van, is situated at the foot of an isolated rock on which are inscriptions in cuneiform Van, Bitlis, and Mush are centres of Armenian districts.

Islands of Anatolia.—Some of the islands are very fertile, others are little more than lofty masses of rock that rise abruptly from the sea. Most of them have steam communication with Smyrna. They produce fruit, wine, raisins, olive oil, and mastic. Sponge fishing is the principal industry. The population is Greek, and Greek dialects are spoken. Excepting Samos, they form the Archipelago Vilayet. *Tenedos* is near the mouth of the Dardanelles. *Lemnos*, midway between Mount Athos and the Dardanelles, has an almost land-locked harbour suitable for large ships. *Lesbos*, or *Mitylene*, between the Dardanelles and the Gulf of Smyrna, was the home of the Æolian school of lyric poetry, and the birthplace of Alcæus and Sappho. It has two deep gulfs, which form land-locked harbours, and hot mineral springs. *Chios*, the most fertile of the islands, is noted for its wine and mastic, and is the reputed birthplace of Homer. **Samos** rose to great power under Polycrates (B.C. 532), and became the centre of Ionian luxury, art and science. It was the home of Pythagoras, and for a time the residence of Antony and Cleopatra. Samos has a good harbour, and is very fertile. Since 1832 it has been a principality paying tribute to Turkey, but otherwise independent. Mountainous *Icaria* is connected with the legend of Icarus; and on rugged *Patmos*, twenty miles south of Samos, St. John wrote the Apocalypse. Further south are *Leros*, *Kalymna*, *Kos*, with its memories of Hippocrates, *Nisyros* with its hot sulphur springs, and *Syme*, a broken, rugged island with two good harbours and a large trade in sponges. *Rhodes*, the most eastern island of the Ægean, has played a conspicuous part in history. It

had powerful fleets, and its maritime laws were embodied in the Roman civil law. Its capital, Rhodes, at the north end of the island, was one of the most magnificent cities of antiquity, and had, at the entrance to its harbour, the bronze "Colossus of Rhodes." For two centuries it was the stronghold of the Knights of St. John, who, after successfully resisting the Turks in 1480, surrendered to Suleiman I. after a famous siege in 1522. The island is only partially cultivated. Between Rhodes and Crete are *Karpathos* and *Kasos*.

II.—CYPRUS

By the late Lieut.-Col. Sir R. Lambert Playfair.

Position and Surface.—Cyprus is the most eastern island in the Mediterranean. Seen at a distance from the west it has the appearance of two islands parallel to each other, owing to the two mountain ranges which run along its northern and southern shores. These are separated by an extensive plain of Tertiary formation called the Mesorea. The northern range, that of Kyrenia, extends from Cape Kormakiti on the west to Cape St. Andreas, at the extremity of the narrow strip of land, called Karpas, which stretches out to the north-east for a distance of 47 miles, with an average breadth of not more than six miles. This range has its crest finely serrated and its sides rather steep, and where it falls to the sea it is bordered by only a narrow plain. The highest summit is the castle-crowned peak of Buffavente, 3,135 feet high, and the most remarkable as to shape is Pendactylon, named from its resemblance to a hand with the fingers outstretched. The southern range is that of Troödos, or Olympus. Its highest point is 6,406 feet, covered with noble forests, and now used as a summer station for the British troops.

Fig. 233.—*Cyprus.*

The extreme length of Cyprus is 140 miles, and its greatest breadth 60 miles. It does not contain a single river, properly so called; what figure as such on the map are winter torrents, dry in summer, or with only a few pools here and there. There are a few lakes, the largest being the salines (*alykæ*) of Larnaka and Limasol, both of which, when dry in summer, yield a large supply of salt.

History, People and Resources.—Cyprus is the Chittim of Scripture, represented as the resort of Tyrian fleets. The Phœnicians established settlements there about B.C. 1045. After the decay of Tyre the island was occupied by colonies from Greece; it passed successively under the dominion of the Assyrians, Egyptians, Persians, Romans, Saracens and Byzantines. In 1191 Richard Cœur de Lion took it and assumed the title of king. Two years later he made it over to Guy de Lusignan, whose

successors became tributaries to the Sultans of Egypt. In 1373 it was taken by the Republic of Genoa, which held it for ninety years, when the Venetians took it, and in 1571 it was conquered by the Turks. By the Anglo-Turkish Convention of 1878 the administration was handed over to Great Britain. The people, mainly of Greek race and language, belong mostly to the Orthodox Greek Church, but about one-quarter of the population are Mohammedans. In early times the hills of Cyprus were densely wooded, but the great demands made on its forests for smelting ore and for shipbuilding were the main causes of their destruction. The principal drawbacks to agriculture are the uncertainty of the seasons and the visitation of locusts. The chief products are cereals, cotton, wine, olive oil, carobs, silk, salt, sponges and leather. An important source of wealth in ancient times was copper (*Æs Cyprium* = Cuprum = Copper), and mining has recently been recommenced.

FIG. 234.—*Average population of a square mile of Cyprus.*

Towns.—*Nicosia* (Greek, *Levkosia*), the capital, on the central plain, was the residence of the Lusignan kings; its monasteries were numerous, and there were about 300 Greek and Latin churches. *Famagusta*, on the east coast, has fortifications which were the work of the Lusignans, Genoese and Venetians; they are in good preservation, but the town itself is ruinous and filthy. The harbour is the only one in the island that could be made available for large vessels, but it is silted up with sand, and the unhealthiness of the site renders it unfit for a military station. *Larnaka*, on the south coast, the ancient Kitium, the rival of Tyre, and the birthplace of Zeno, founder of the Stoics, is the principal commercial emporium of the island, and the residence of the foreign consuls. It has no harbour, and the roadstead is exposed to the south and east. The old town is about a mile and a half from the sea; the newer portion, along the shore, is called La Scala, or Marina. The antiquities of Cyprus are as varied as they are numerous, and there is hardly a museum in the world that has not a collection of objects found in Cypriote tombs. The local museum at Nicosia contains a good collection of the treasures unearthed since the British occupation.

STATISTICS.

	1891.	1901.
Area of Cyprus	3,584	3,584
Population of Cyprus	209,286	237,022
Density of population, per square mile	58	66
Population of Nicosia	12,515	14,752

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III.—MESOPOTAMIA

By General Sir Charles W. Wilson, K.C.B., F.R.S.

Position and Surface.—Mesopotamia includes all Turkish territory south of Diarbekr, which lies between the eastern edge of the Syrian desert and the foot of the mountains that buttress the Persian plateau. Mesopotamia proper, the country between the Euphrates and the Tigris, has a gradual fall of 950 feet from the spurs of the Taurus range to an old coast-line south of Hit. Thence an almost unbroken plain extends to the Persian Gulf. The great plain of Upper Mesopotamia is broken by low ranges of hills between which the Khabur and its tributaries flow to the Euphrates. Between the Khabur and the Euphrates lies the Biblical Aram-Naharaim, a fertile district watered by the Belik, once cultivated and thickly peopled, but now waste. On the plain east of Mosul, between the Tigris and the Khazr, was the heart of the Assyrian Empire. The mountain district that borders the plain and extends to the Persian frontier forms part of Kurdistan. The lower plain (ancient Babylonia), south of Hit, was formerly a vast expanse of fertile land intersected and irrigated by canals. It is now almost uncultivated and partially covered with fever-breeding swamps. At Kurna the Euphrates and Tigris unite, and their combined stream forms the Shatt el-Arab. The delta of the great river is advancing at the rate of about 72 feet per annum, but the land is liable to frequent inundation. The hills of Upper Mesopotamia are limestone. The plain south of Jebel Sinjar is a dreary flat, with a subsoil of gypsum and marl, intersected by nullahs. At Hit, Hammam Ali, and other places are petroleum, bitumen, sulphur, and salt springs. The climate is good in winter, but so hot in summer that people usually pass the day in underground chambers (*serdab*). The lion, leopard, wild ass, wild boar, and gazelle are found in certain localities.

History and People.—The early history of Mesopotamia is one of constant struggles for supremacy between contending nations. But the country remained rich and prosperous until the battle of Kadisia (A.D. 635) placed it at the mercy of the Arabs. As the nomads pressed forward the peasants were driven from their lands, the great irrigation works were neglected, and the Euphrates, no longer controlled, spread out into wide marshes. What the Arabs commenced Turks, Mongols and Tatars completed, and one of the most fertile regions of the Earth was abandoned to nomads. The majority of the population is now Arab, sedentary and nomad ; but the original inhabitants are still represented by Kurds, Yezidis or "Devil Worshippers," Nestorians, Chaldæans or Roman Catholic Aramæans, and Jacobites in the north ; and by Sabæans in the south.

Trade, Communications and Towns.—The only manufactures are for home consumption. The chief exports are cereals, dates, wool, gum, rice and hides ; and the imports sugar, cloth, coffee, indigo, iron and

copper. The foreign trade is chiefly with the United Kingdom, India and Persia.

On the Tigris passengers and merchandise are carried from Diarbekr to Baghdad on rafts of inflated sheepskins. Below Samara sailing boats are used. From Baghdad river steamers run to Basra, whence there is steam communication with India and England. In flood time a steamer ascends the Euphrates as far as Meskineh, but there is no trade. All land transport is by mule or camel.

There are four vilayets and one separate sanjak in Mesopotamia. Amongst the towns are *Diarbekr* (*Amida*), at the head of raft navigation on the Tigris; *Urfa* (*Edessa*); *Harran*, "the City of Nahor"; and *Mosul*, on the Tigris, opposite the mounds *Kuyunjik* (*Nineveh*). *Baghdad*, the city of Harûn er-Rashîd, has a large transit trade. It occupies an unrivalled position as a centre of trade, but has lost much of its former wealth. *Basra*, on the Shatt el-Arab, is the port of transhipment from river craft to ocean steamers, and has a large trade in dates. *Nejef* and *Kerbela*, the burial places of Ali and Hussein, lie west of the Euphrates, some miles from the mounds of Babylon. They are the "Holy Places" of the Shia Moslems, and every year large pilgrim-caravans arrive from Persia bearing corpses to be buried within the sacred precincts.

IV.—SYRIA

By General Sir Charles W. Wilson, K.C.B., F.R.S.

Position and Surface.—Syria, which includes Palestine, stretches southward from Anatolia, and is separated from it by the deep gorges of the Jihûn and its tributaries. Its western limit is the Mediterranean: its eastern the valley of the Euphrates. On the south Wadi el-'Arish separates it from Egypt, but no natural feature parts it from Arabia. The coast towards the north is rocky; towards the south low, and in places sandy. There are no good harbours, but several open roadsteads and small ports, at which steamers call—Iskanderûn, Latakia, Tripoli, Beirût, Haifa, and Jaffa.

Syria and Palestine comprise a coastal plain of varying width, two parallel ranges of mountains between which lies a remarkable depression, and a plateau falling eastward to the Euphrates. On the north the mountains approach the sea, and here the coastal plains are small and narrow. But south of Mount Carmel the hills recede from the shore and leave room for the broad fertile plains of Sharon and Philistia. The coast range is known under different names. The Giaour Dagh (*Mons Amanus*) extends from the gorge of the Jihûn to the valley of the Orontes, and, though rarely more than 6,000 feet high, is crossed by only two good passes—the Amanian and Syrian "gates." Between the Orontes and the valley of the Nahr el-Kebir (*Eleutherus*), "the entrance of Hamath," are

the rugged Ansariyeh mountains, over which there is no good pass. South of the Eleutherus is Mount Lebanon, which has its culminating point in Dhahr el-Kosdib (10,050 feet), and is crossed by only one good pass. The gorge of the Litany (*Leontes*) separates Lebanon from the hills of Galilee, which gradually break down to the plain of Esdraelon and valley of the Kishon. Southward of Esdraelon stretches the hill country of Samaria and Judæa, which falls away, south of Hebron, to the desert plateau of et-Tih. East of the coast range is the great rift-valley, or depression, in part below the level of the sea, that extends from the base of the Giaour Dagh to the Red Sea, and probably far into the heart of Africa. In this valley flow the Orontes and its tributary, the Kara Su ; the Leontes and the Jordan. The Orontes and Leontes rise near each other between Lebanon and Anti-Lebanon, and one flows north, the other south until both cut their way westward to the sea. The Jordan rises west of Mount Hermon, and after spreading out into Lake Huleh and the Sea of Galilee discharges its waters into the Dead Sea, 1,292 feet below the level of the sea. From Lake Huleh to the Dead Sea, which is salt and has no outlet, the course of the Jordan is below the sea-level. Between the Dead Sea and the Gulf of Akabah the depression is known as the Arabah. The range east of the depression is

FIG. 235.—*Section from the Mediterranean across the Dead Sea.* (*Heights exaggerated* 8 *times.*)

not always well defined. In the north it is a long unbroken ridge of limestone, called the Kurt Dagh. Farther south it is continued by Anti-Lebanon, which ends abruptly in Mount Hermon (9,200 feet) ; and it is then represented by the hills of Bashan, Gilead, Moab and Edom. Eastward of this range the ground falls gradually to the Euphrates. North of Aleppo, where the distance between the Mediterranean and the river is only from 110 to 140 miles, the plateau presents the character of rolling downs broken by rich well-watered valleys. South of Aleppo the plateau gradually broadens out into an extensive pastoral district, with a scant supply of water, which east of the Dead Sea is between 500 and 600 miles wide. This district, known as the Syrian desert, stretches southward into Arabia. With the exception of the sandstone and granite hills of Edom, limestones prevail throughout the country. Igneous rocks appear in a few localities west of Jordan, and east of the river there are large areas of basalt—the Leja, Hauran, &c., which correspond to the Harras of Arabia. The most important geological feature is the great rift or valley hollowed out along a line of fracture and displacement of the Earth's crust before the Cretaceous period. Bitumen and bromine are obtained from the Dead Sea, and petroleum would probably be found

by boring. Near Tiberias and near Umm Keis (*Gadara*) there are hot sulphur springs.

Climate and Resources.—The climate of the coast and hill country is not unlike that of southern Italy, but in the Jordan valley, near the Dead Sea, it is almost tropical. Snow falls heavily on the mountains of northern Syria, and occasionally as far south as Jerusalem. The summers on the eastern plateau are intensely hot.

The cedars of Lebanon are now represented by small groves, and there are no large forests such as exist in Anatolia. In certain localities, however, the hills are well-wooded, and in the Jordan valley the vegetation is sub-tropical. Wheat is grown on the coast and upland plains, the olive, fig, and vine are cultivated in the hills, and the downs of the eastern plateau afford pasturage for countless flocks of sheep. But the ground is still for the most part waste, and though the ancient terrace-culture is in places being restored, it will be long before the country can recover from the ruin and desolation of centuries. Bear and panther are found in the northern districts, deer and gazelle occasionally in the south. There is a close affinity between the fauna of the Jordan and the rivers of tropical Africa. The crocodile still lives in the Nahr ez-Zerka, south of Carmel.

History and People.—At the earliest period of which there is any record northern Syria was in the hands of a strong power—the Khita, or "Hittites," whose capital was at Kadesh, on the Orontes. Palestine was, at the same time, occupied by a number of petty States sometimes free, sometimes subject to Egypt. Later the Phœnician cities, including Tyre and Sidon, rose to great power and splendour; and the Jews entered Palestine, where they created a kingdom that attained its widest extent in the reign of Solomon. Hittites and Jews were alike conquered by Assyria, and the whole country afterwards passed first to Persia, then to rival Seleucids and Ptolemies, and next to Rome. Syria and Palestine fell an easy and early prey to the Arabs, and, like Anatolia, they were either wholly or in part overrun by nomad Seljûks, Mongols and Tatars. Agriculture was destroyed, towns were deserted, and the rich lands turned into a wilderness. In the eleventh century the ill-treatment of the Christians by the Moslems at Jerusalem and in the Holy Land led to the Crusades. Jerusalem was taken in 1099, and a Latin kingdom established in Palestine, which lasted for eighty-eight years. At the same time Antioch, Tripoli, and other places were erected into principalities or countships. In the sixteenth century Syria was conquered by the Osmanli Turks, in whose possession it still remains. The most momentous events in the history of the country are those connected with the birth and ministry of Christ and the spread of Christianity after His crucifixion.

In the Giaour Dagh and the country eastward to the Euphrates the people, excepting in a few Armenian villages, are of Turk or Mongol origin, and speak Turkish. To the south Arabic is spoken, but the population is of varied origin. The Ansariyeh are partly descendants of the

original inhabitants of the mountains, and partly of Persian origin. They worship the Sun and Moon. The Maronites of Lebanon are Christians belonging to an indigenous race akin to the Ansariyeh. The Druses, who dwell in Lebanon and the Hauran, are partly indigenous and partly of Persian origin. South of the Litany the peasantry (*fellahîn*), whether Christian or Moslem, are for the most part of Canaanite origin, but there has been a great fusion of blood. In most of the inland towns the Moslems are of Arab and the Christians of Aramæan origin. Jacobites are thinly scattered over the country. The Syrian desert is occupied by nomad Arabs, who at times advance to the vicinity of Aleppo, Homs, Damascus, and the Jordan. Colonies of Germans, Jews, and Circassians have been established during the last thirty years, and Palestine is dotted with monasteries occupied by Greek, Latin, Russian, and other monks.

Trade, Communications and Towns.—Silk, half-silk stuffs, soap, and articles for sale to pilgrims are manufactured, but the principal occupation of the sedentary population is agriculture. The chief exports are wheat, fruit, wool and hides; the imports mainly textile fabrics and iron goods. There is an excellent carriage-road from Beirût to Damascus, and inferior roads run from Iskanderûn to Aleppo, Haifa to Nazareth, and Jaffa to Jerusalem. Lines of railway connect Beirût with Damascus and Jaffa with Jerusalem, and a steam tramway runs from Damascus to the Hauran. Other inland transport is by mule or camel.

In Syria there are two vilayets, one separate sanjak, and one district (Lebanon), with a special constitution guaranteed by the European Powers. Amongst the towns are : *Iskanderûn* (*Alexandretta*), the port of Antioch, Aleppo, and parts of Mesopotamia, near the Beilan pass. *Beirût*, the port of Damascus, and the largest maritime town in Syria. *Aintab*, east of the Kurt Dagh, with a large Armenian community and an American college. *Aleppo*, a place of military and commercial importance from the earliest times. *Antioch*, on the Orontes, the ancient capital of Syria. *Damascus*, the largest town in Syria, built amidst extensive gardens, on the edge of the desert, beneath Anti-Lebanon. *Jerusalem*, in the heart of the hill country of Judæa, is sacred alike to Christian, Jew and Moslem. The city, which contains the sepulchre of Christ and the rock from which Mohammed is said to have ascended to heaven, is annually visited by numbers of Christian and Moslem pilgrims. *Hebron*, in the hills south of Jerusalem, is the burial-place of the patriarchs.

V.—ARABIA

By General Sir Charles W. Wilson, K.C.B., F.R.S.

Position and Coasts.—The Arabian Peninsula stretches southward from Edom and the Syrian desert, of which it is a direct continuation. Its size is about one-third that of Europe, and its form is strikingly regular.

On the north, where there is no natural frontier, a line joining the head of the Gulf of Akabah with that of the Persian Gulf (very nearly the parallel of 30° N.) is generally adopted as the boundary. On the west, south and east its shores are bathed, respectively, by the waters of the Gulf of Akabah and the Red Sea, of the Indian Ocean and of the Persian Gulf. Isolated thus in a measure, and traversed by no important trade route, Arabia had little in common with the great empires of the ancient world. But her position was favourable to maritime enterprise, and the keen commercial instinct of her people soon led them to push their fortunes beyond their own shores. At a remote period the south coast became the seat of a sea-borne trade with south-eastern Africa on the one hand, and India and the further East on the other.

The west coast is almost a straight line. It has open roadsteads, difficult of approach on account of shoals and coral reefs, but no true harbours. Towards the south there are small islands, of which the most important is Perim, at the entrance to the Strait of Bâb el-Mandeb. The south coast, from the strait to Ras el-Hadd, is slightly convex towards the Indian Ocean, and has some good harbours—Aden, Dafur, and Keshum. The east coast, from Ras el-Hadd to Cape Masandam, is nearly parallel to the west coast, and has the almost land-locked harbour of Muscat. At Masandam the oceanic coast line ends. Beyond it lies the shallow Persian Gulf, with its low, sandy shore stretching eastward and northward to the harbour of Koweit, or Grane, near its head. Close to the narrow entrance to the gulf are several islands (Jishm, &c.); and the coast of Katar, beyond Masandam, is bordered by islands (Bahrein, &c.), celebrated for their productive pearl fisheries.

Configuration.—The relief of Arabia is also regular. The table-land, which extends southward from the Syrian Desert, is buttressed by coast-ranges that attain their greatest altitude in the south, and are often rugged, and precipitous in outline. The centre of this mass is occupied by a plateau with long, undulating slopes, covered with pasture, and deep, narrow valleys in which lie irrigated gardens and plantations. This is Nejd, the true home of the Arabs. In the latitude of Mecca a ridge joins Nejd to the western coast-range. Elsewhere it is bordered by arid desert, or wastes of shifting sand, the Nefuds. Between the coast-ranges and the sea there is a low-lying strip of sand and coral *débris*, with a hot climate, and forbidding aspect. This is the Tehama, a name specially applied to the Red Sea littoral south of Mecca. As the valleys of Arabia originate in no well-defined ridge, the line of water-parting is irregular. Many of the districts are well supplied with water, but no stream of any size reaches the sea. The central plateau, the desert, and the coast range (including the Tehama), each occupy about one-third of Arabia.

Geologically, the peninsula apparently consists of granites, traps, and old basalts, on which lie Cretaceous sandstones continuous with those of Petra. Limestones, sometimes with flints, overlie the sandstones, and in

the north (*Arabia Petræa*) the surface is covered with flint gravels. At intervals, on a line, approximately parallel to the Red Sea depression, are vast lava beds (*harra*) with their craters, which may be compared with those in Syria and Palestine. The largest are Harrat el-'Aue, near Medain Salih, and Harrat Khaibar, north of Medina.

Climate and Products.—The climate varies greatly. The coast districts are hot and unhealthy. The mountain districts of Oman are healthy and cool. On the central plateau, where heavy rains fall in spring and autumn, the days are hot, and the nights cold. In Yemen the winter temperature often falls below freezing, whilst in summer it is rarely over 80° F. in the shade; rain falls in March and again in July, August and September. As far north as et-Taif, east of Mecca, rain lasts about five weeks in autumn. In the north rain is rare and falls in winter.

The most fertile district of Arabia is Yemen, where coffee, fruit and vegetables are extensively cultivated. Senna grows in southern Hejaz and the Tehama, balsam in Safra, near Mecca, henna on the west coast, incense in Hadramût, indigo on the shore of the Persian Gulf, and the date palm in many places. Coco-nut, betel, banana, &c., have been introduced from India, and thrive well. The only important routes in Arabia are those along which pilgrims travel to Mecca from Syria, Egypt and Persia.

The horses of Arabia have always been celebrated. The best, for which high prices are demanded, are bred in Nejd, where the pedigrees are carefully kept. Riding camels (dromedaries), with good pedigrees, come from Nejd and Oman. Common camels are often reared and kept for their milk, wool, and flesh. The large white donkeys of Hassa and eastern Nejd are much prized in Egypt and Turkey. Broad-tailed sheep are bred in Yemen and Nejd, goats in Hejaz, cattle with a hump in Yemen, Oman and Nejd, and cattle without a hump in the north. Ostriches are found on the central plateau, small tigers in Oman and Nejran, and the panther, lynx, hyæna and gazelle in several localities. The pearl-fisheries on the east coast are said to yield nearly £300,000 per annum.

People.—The population is very sparse. The inhabitants, excepting Turkish officials and soldiers, belong to two great septs—the Joktanites and the Ishmaelites, both having Arabic as their language, and Islam as their religion. The Joktanite tribes occupy the southern districts, and are the more ancient. They are descendants of Shem, through Joktan (*Kahtan*), the father of Hazarmaveth (*Hadramût*), Sheba (*Saba*), Ophir, and others. The sept is divided into three stems descended from Saba (*Abd esh-Shems*, "servant of the Sun"), through his son Himyar, and his grandsons, Malik and Arib. Hence they were called Sabæans. The Ishmaelite tribes, also called Nizarites, are descended from Ishmael, through el-Yas, and Keis Alan the grandsons, and Rabiah, the son of Nizar. The tribe of Koreish, to which Mohammed belonged, was a branch of el-Yas. The most important historical events are the foundation of a new religion, Islam, by Mohammed, and the rapid rise of the Arabs to power. The

flight (*Hejra*) of Mohammed from Mecca to Medina (Friday, July 16, 622 A.D.) is the date from which Moslems commence their era. The Prophet died in 632, and ten years later the Arabs had conquered Palestine, Syria, Mesopotamia, Persia, Egypt, and North Africa. At present the tribes in Hejaz, Yemen and Hassa are subject to Turkey; those in Nejd are practically independent, and those between Aden and Muscat pay no tribute to, and have no communication with, Turkey.

Hejaz and Yemen.—The western coast-range of Arabia, which continues the mountains of Moab and Edom, has no defined crest line. Here and there it is broken by broad valleys, and one of these, Wadi Hams, separates Madian (Midian) from Hejaz. The Turkish province of **Hejaz** extends from Madian to Yemen, and is from 60 to 150 miles wide. The pilgrim routes from Syria and Egypt pass through it, and the southern end in which Mecca lies is known as the Haram, "sacred territory." The water is brackish, and, in some of the wells, tepid. *Mecca*, the birthplace of Mohammed, is about fifty miles from *Jedda*, its port on the Red Sea. A pilgrimage to Mecca is incumbent, once in his life, on every Moslem, and every year the holy city is crowded with pilgrims, most of whom travel by sea, and disembark at Jedda, the seat of government. *Medina* also lies inland from its port *Yambo*. The trade, except during the time of pilgrimage, is small.

The Turkish province of **Yemen** occupies the south-west corner of the peninsula. Beyond the Tehama the mountains rise rapidly to a height of from 6,000 to 10,500 feet. They are cut up by deep ravines, and their slopes are terraced for the cultivation of coffee, wheat, fruits and vegetables. The highlands of Yemen consist of a succession of gently sloping valleys, which are terraced and cultivated, and form the plateaux of Nejran on the north, Sanaa on the south, and Mareb on the east. The roads in Yemen are zigzag paths, with massive, perhaps ancient, paving. The soil, disintegrated trap rock, is rich, and generally bears two crops a year. The capital, *Sanaa* (7,600 feet), has a population of about 35,000, including 5,000 Jews. Its port is *Hodeida*, where the coffee and hides of Yemen are shipped. Yemen was the seat of the oldest and most important of the Arab monarchies, and its merchants traded with India at an early date.

Aden.[1]—The British settlement of Aden is almost the most southerly point on the Arabian coast, being situated in 12½° N. latitude and 45° E. longitude. It is a peninsula of an irregular oval form, of about 15 miles in circumference, connected with the mainland by a narrow, sandy isthmus. The town and part of the military cantonments lie in a large crater enclosed by precipitous hills, the highest peak of which is 1,775 feet above the sea. The whole place appears utterly sterile, but it is not without a flora of a very interesting character, containing at least 100 species of plants.

[1] By the late Sir R. Lambert Playfair.

The climate during the north-east monsoon, from October to April, is cool and agreeable, but during the rest of the year the heat in the crater is very great, although at Steamer Point, on the western side, the sea breezes are refreshing.

Aden became a British possession in 1839, when the town was a complete ruin, with not more than 600 inhabitants. Now it is large and flourishing, with about 30,000 inhabitants, Arabs, Somalis, Jews and Indians, without including the garrison and European officials. A large part of its supplies comes from the British Somaliland protectorate on the African coast. The harbour is about three miles wide at the entrance, and affords shelter in all weathers for vessels drawing less than 20 feet. It is unsurpassed by any on the Arabian or adjacent African coasts, and is one of the most important coaling stations in the world. Recent defensive works have made it practically impregnable. Being a free port, like Gibraltar, it has become the principal *entrepôt* for the trade of all the neighbouring countries. The natural water supply is very limited, but condensers have been erected at the harbour, and the magnificent ancient reservoirs, capable of containing twenty million gallons of water, have been thoroughly restored to catch the rare rainfall.

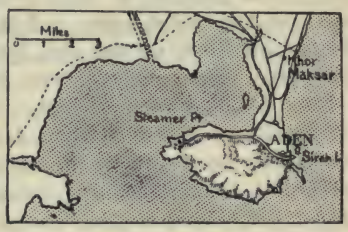

FIG. 236.—*Aden Harbour.*

Perim.[1]—An important dependency of Aden is the island of Perim, at the mouth of the Red Sea, which was annexed during the war between Great Britain and France in 1799, when it was feared that Napoleon contemplated a junction with Tipu Sultan in India. Subsequently, owing to the increase of steam communication through the Suez Canal, it became necessary to facilitate the dangerous navigation of the Red Sea, and Perim was again occupied, a lighthouse being built upon it. It is not fortified, and its fine harbour is leased by a private company as a coaling station.

For administrative purposes Aden and Perim are placed under the government of Bombay.

Hadramût (Hazarmaveth), the centre of the ancient trade in myrrh and frankincense, is a broad valley in the sandstone district which, for one hundred miles, runs nearly parallel to the south coast, and discharges its waters into the sea east of Saihut. The capital, *Shibam*, is in the valley; the port is *Makalla*. East of Hadramût are Dhofar, the old frankincense country, and Mahra, with fertile coast plains, and mountains clothed with tropical vegetation.

Oman, a mountainous district, lies between Ras el-Hadd and Cape Masandam. The principal range, Jebel Akhdar (10,000 feet), is partially

[1] By the late Sir R. Lambert Playfair.

covered with vegetation, and its coast plain is fertile and cultivated. There is a small trade at *Muscat*, the capital. The kingdom of Oman attained its greatest splendour early in this century, when it included the islands of Sokotra and Zanzibar. Its proximity to India has often involved it in relations with that country. West of Masandam, and north along Hassa, a district of the Turkish province of Basra, there is little cultivation except near Katif and Grane.

Central Arabia.—The northern portion of Central Arabia (1,000 to 2,500 feet in elevation), which has a hard gravel surface with stunted bush, and sparse grass, is intersected by two wadis that terminate in the oases of Jowf and Teima (*Tema*). South of Jowf lies a desert of sand, drifted by the wind into high ridges called Nefud, and sometimes difficult to cross on account of want of water, and the simûm—a circular storm of heated, sand-laden air—that moves slowly across the desert like a cyclone. Further south are Harrat Khaibar (5,400 feet), with broad, well-cultivated valleys; the fertile depression of Kasim (2,000 feet), and the Towik plateau, or Nejd. The plateau, over 5,000 feet, is about one hundred miles wide, and is separated from the coast districts of Hassa and Katif, on the east, by a desert of reddish sand from fifty to sixty miles wide. On the west it is connected with the coast-range by a ridge about 4,000 feet high. Politically the plateau is divided into the districts of Sedeir, Woshin, Ared, and Aflaj. South of the plateau are the hot, fertile district of Yemama, the peaks of Haruk (2,000 feet), and the Dahna desert of burning, reddish sand, which extends from Yemen to Oman, and is estimated to cover 50,000 square miles.

STATISTICS OF ASIATIC TURKEY.

(*Estimates.*)

Division.	Area in Square Miles.	Population.	Density of Population.
Anatolia	270,200	12,005,500	44
Mesopotamia	100,200	1,350,300	13
Syria	109,500	2,711,900	25
Arabian Provinces	173,700	1,050,000	6
Total Asiatic Turkey	653,600	17,117,700	26
Independent Arabia	1,230,000	8,500,000	7

POPULATION OF CHIEF TOWNS.

Smyrna	210,800	Baghdad	65,000	Erzerûm	42,500
Damascus	180,000	Jerusalem	58,000	Mosul	40,000
Aleppo	115,000	Kaisariyeh	48,800	Basra	40,000
Beirût	110,000	Trebizond	45,000		
Brûsa	70,000	Sivas	43,100		

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CHAPTER XXV.—THE COUNTRIES OF IRAN

I.—PERSIA

By Major-General Sir Frederic Goldsmid, K.C.S.I.

Position and Boundaries.—Persia is the *Pars* or *Fars* of Ezekiel, a name now given to a southern province of the Shah's kingdom only. The native name *Iran* applies to the whole upland country from Kurdistan to Afghanistan, of which the older inhabitants were "Aryans." Ancient Persia, as existing some centuries before the Christian era, was an immense range of territory extending west and east from the Mediterranean to the Indus, and north and south from the Jaxartes to the Arabian Sea. Modern Persia is said to comprehend an area of some 650,000 square miles, on the western and larger portion of the great Iranian plateau. Yet its extreme breadth measured along the parallel of 34° N. from the Turkish to the Afghan frontier, is scarcely 1,000 miles, while the length from the Daman-i-kuh, the mountain range on the Trans-Caspian Russian frontier, to the sea coast about the meridian of 57° E., may be reckoned at 900. The northern frontier is formed by the Aras river, the southern shore of the Caspian and the Atrek; the southern is the sea coast, and on the west the mountains of Kurdistan divide Persia from Turkey. On the east an irregular, but in parts well-defined, frontier commences somewhat west of Herat on the Hari-rud, runs southward bordering Afghanistan, turns abruptly to the Helmand follows the foot of the Baluchistan hill-range, and making a curve to the west crosses Mekran southerly to the sea in longitude 61° 53′ E.

Configuration.—Persia is an elevated tableland dropping to the Caspian Sea along nearly one-third of its northern frontier, and to the Persian Gulf along its southern limit. In the central highlands there are few rivers, and the country is either composed of parallel mountain ranges and broad intervening plains, or of irregular mountain masses with fertile valleys, basins and ravines. About one-third of the area is occupied by deserts and saline wastes, quite irreclaimable and useless. For irrigation the plains and valleys depend on the mountains which collect rain and snow. The valleys are more fertile than the plains, often affording bright, picturesque, and grateful prospects, while the latter are usually barren and sandy wastes, scored, or streaked, as it were, rather than ornamented, with patches of green oases. With the exception of those dividing the coasts of the Caspian from the inland plateau, and those bordering the Arabian Sea and Persian Gulf, the parallel mountain ranges generally stretch from

north-west to south-east. They are considered to present the same geological features as the Zagros chain which consists of Cretaceous nummulitic rocks. The Zagros is the whole mountain range from Ararat to Shiraz, forming the gigantic frontier wall between Persia and Turkey. The occurrence of metamorphic rocks has also been noticed, as well as an extensive area of volcanic formations, some of very recent origin. Both the northern and southern slopes of the lofty Elbúrz range are rich in coal and iron. The highest peak of this range, which overlooks the southern shore of the Caspian, is Demavend, a beautiful mountain not less than 19,000 feet in height. Of the southern border-land of the Persian plateau, Blanford remarks that the part traversed by him appeared to consist of low ranges running east and west, which, except near the sea, were almost entirely composed of unfossiliferous sandstones and shales associated with a few beds of nummulitic limestone, apparently belonging to the older Tertiary epoch.

Rivers.—Among the few rivers which merit special mention are the Safid-rúd and Karun. The former flows into the Caspian near Enzeli, the ordinary port of embarkation for passenger traffic with Russia; the latter, from its position and proximity to the Persian Gulf, offers immense advantages to Indian traffic and is, practically, and that only with reference to small steamers, the one navigable river in the kingdom. Many of the rivers of the interior have an inland drainage, flowing into lakes or losing themselves in the sand, for instance the Helmand, of which the upper part is wholly in Afghanistan. This lack of rivers is a great bar to agricultural development; and the uncertainty of rainfall compels the cultivator to trust too largely to the primitive *kanáts* or underground galleries, which conduct water, so long as procurable, from the mountains to the centres of cultivation. Famine and drought are unfortunately no uncommon visitations in the "land of the Lion and Sun," and if snow fail as well as rain, and springs cease to issue, the result is truly deplorable. When there is irrigation, the productiveness of the soil is remarkable.

Climate.—The climate of Persia varies much according to locality. In the high tablelands, that is over Persia generally, it is intensely cold in winter, and though hot in summer, the dry clear heat is temperate compared to that of Sindh and the Panjab. In the north the lowlands of the Caspian are covered with forest, and the atmosphere is damp, feverish and relaxing. The maritime tracts on the south are so dry and barren that even the hot and violent winds which blow over them afford a certain amount of relief to the inhabitants during the prevalence of a scorching summer. Spring and autumn are the best seasons; October is perhaps, in its invigorating freshness, the most enjoyable month in Tehran and the southern lower slopes of the Elbúrz; while February, owing to its bitterly cold winds, is to be avoided by the traveller, posting or otherwise making his way to the capital from Tabriz.

From the absence of statistics of the rainfall the estimate of experienced

residents must be employed to supplement the returns. Rain is fairly abundant in the north-western mountains, and on the shores of the Caspian the amount probably varies from about 20 to over 40 inches. At Tehran the annual fall is about 12 inches; and on the plateau generally considerably under 10 inches. While more than 14 inches fall at Bushire on the Persian Gulf, there are less than 6 inches at Yask. Summer is the driest season. Remains of water-channels, used for irrigation, show how carefully the scanty supply was husbanded in former days.

Flora and Fauna.—Forests are rare and not dense. No part of the country is so thickly wooded as the low tract south of the Caspian. Among the trees are the oak, beech, birch, elm, walnut, plane, sycamore, ash, yew, box and juniper. Amongst the flowers the roses are particularly celebrated. Numerous gardens and some beautiful trees are commonly found in the neighbourhood of large towns, not cared for as in Europe, yet pleasant in their wildness.

Among the wild animals are the lion, tiger, leopard, lynx, wolf, jackal, wild ass, wild sheep, gazelle, and deer. The tiger is peculiar to the Caspian provinces, but is not a man-destroyer. Among game birds, three kinds of partridge are well known, the sand grouse, and *Hubárá* or common native bustard. Of domestic animals the horse, mule and camel occupy an important position; oxen also are used for tilling purposes. The "Persian cats," so celebrated in Europe, are confined to a few localities.

FIG. 237.—*Average population of a square mile of Persia.*

People and History.—Persia of to-day, despite its diminished area, may be said to comprise quite as much settled and consolidated territory as at any period of its authentic history. The several invasions by neighbouring nations on its land frontiers, have naturally affected the character of its population. On the north, Mongol, Tatar and Arab settlers have mixed with the older inhabitants of Khorasan, and the Iranian element has lost much of its original purity. Again, on the west and south-west, the Turkish *Kashkai*, the Arab *Kamisa*, and many like tribes are foreigners amid the descendants of the old Persian stock; and the same may be said of the Afghans, Baluchis and peoples who hail from east of Kerman and Mekran, and even from the Indian peninsula. The physique of the Persians is intrinsically fine, but seldom fairly developed. As a rule, the rich and middle classes, in spite of high abilities and reasoning power, ruin their constitutions by sensuality and dissipation; while the poorer and working classes, with less power of reasoning, but healthier tastes and habits, have barely sufficient sustenance to give nature fair play. There are two distinct classes of inhabitants, dwellers in towns or villages and dwellers in tents. The former class remains stationary during the greater part of the year, only the richer people leaving the

towns during the summer heats. The nomads move from place to place according to the season. They include Arabs, Kurds, Lurs, Gipsies and Turks; but are generally classed as Iliyats, and serve their own particular leaders, all acknowledging a hereditary chief called the *Ilkhání*. The close adherence to ceremony and etiquette, ready adaptation to foreign habits, together with the capacity for using and love of receiving the finest forms of flattery, which in the days of Herodotus were found the notable features of the national character, are still to be observed in the capital. For an Oriental, the Persian is a bright companion, more active in mind and body, and more intelligent than the Turk, and not so much a slave to custom. He is obstinate and enduring, but without perseverance; though often a spiritual dreamer, he refuses to think steadily on common things.

Ninety per cent. of the people are Mohammedans of the Shihite division, who maintain that the legitimate Khalifa or successor of the Prophet was Ali his son-in-law; in opposition to the views of the Sunnis to which sect most of the rest of the population belong. This distinction is the cause of constant internal conflict, and is fatal to that political unity for which a common faith offers the surest guarantee.

FIG. 238.—*Persian Royal Standard.*

Government.—The Shah is regarded as Vicegerent of the Prophet; consequently his acts are those of an absolute monarch, and his will is the acknowledged law of the State. Oriental despots, especially those professing the faith of Islam, have usually the same besetting proclivities, and are educated on one pattern, so that the regeneration of a kingdom like Persia can only be looked for by the exercise of healthy influence from without. If truth or honesty exists in Persia, it must be looked for in the poorer and humbler classes, rather than among those who adopt the veneer of European civilisation. Provinces and districts are sold to the most lavish bidder, who if not wealthy enough to pay the heavy price himself must do so by practical robbery in the name of taxation. It is not uncommon, however, to make the *Hakim*, or ruler of one of the larger provinces, perhaps a Shahzáda or one of royal birth, only a nominal head, and to associate with him a really competent and intelligent *Wazir* or Minister, who does the whole work of administration, and, in his way, does it well. In such cases there is a kind of real justice dispensed. With Turkey on one flank, Afghanistan and Baluchistan on the other, and the Arabian Sea and Persian Gulf on the south, Persia finds her northern frontier wholly occupied by Russia, and Russian influence in trade and in the development of the country is predominant all over the north. The profession of a common Mohammedanism does not necessarily draw the Turk or Afghan towards his Persian brother, and

there is comparatively little intercourse with west and east. On the sea side, or southern line of boundary, the United Kingdom has more direct relations than any other State and dominates the commerce of the south. Not only is Indo-Persian traffic facilitated by ready communication with Bombay and Karachi; but the existence of a British Protectorate for the waters west of Ormuz and the presence of a British Consul-General at Bushire, enable the Shah's Government to maintain its authority on the northern littoral of the Persian Gulf.

Trade and Communications.—The natural products of Persia are tobacco, silk, wool, cotton, grain (mainly wheat and barley), wine and opium. In a more restricted sense may be added rice, jute and sugar; but the cane has been indifferently cared for, and beetroot has not been made freely available to supply its place. There are also many medicinal and dye yielding plants; gums such as assafœtida, rhubarb and liquorice for the most parts wild and abundant. Fruit of many kinds esteemed in Europe and Asia is good as well as cheap and plentiful.

The carpets are justly celebrated among Persian manufactures. Those made in Kurdistan, Khorasan, Ferahan (a district said to possess 5,000 looms), Káin and Kerman have, more or less, distinctive features of their own; the first named being the more generally appreciated. Turkman carpets, with which the bazárs of Mashad abound, are in repute from their texture and velvety pile. Ispahan and Yezd are famed for their *namads*, or woollen felts. Another branch of interesting native industry is the manufacture of shawls, for which Kerman is considered almost equal to Kashmir. They are woven by hand out of *kurk*, the under wool of the goats. Many native Persian industries, such as the fashioning of sword-blades, brass and copper vessels of all sorts, carved and inlaid metal and wood, together with exquisite ornamental tiles, are yet in full vigour, but some of them are only faint representatives of former days.

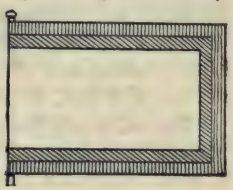

FIG. 239.—*Persian Merchant Flag.*

The few carriage-roads in Persia are limited to short distances of a hundred miles or so from the capital, the chief being to Kazvin and Resht, but it is probable that they will be extended and improved at an early date. There are many tracks and rough lines of traffic which could easily be rendered practicable not only for *chapar* (or posting), caravans and mule-drawn-litters, but for wheeled traffic. The physical difficulties in the way of a complete system of roads are great, but the results of such innovation, if once admitted, could not fail to bring profit both to the rulers and people. The most important lines of communication for Persia are those which connect the capital with Tabriz, Resht, Astrabad, Mashad, Ispahan, Yezd, Kerman, Shiraz, Bushire, and the Turkish frontier at Kháníkín. The only railway in the country which was ever completed is in the close vicinity of Tehran, and is only six miles long.

The Indo-European Telegraph Company works and controls the Julfa-Tehran telegraph line (437 miles), and the Indian Government controls the Tehran-Bushire line (675 miles), and assists in maintaining the Tehran-Mashad line (568 miles) and the overland line from Kashan by Kerman and Baluchistan to India. A line along the Mekran coast from Karachi to Jashk (601 miles), and the Persian Gulf cable from Karachi to Fao, are also worked and maintained by the Government of India as part of the connection with Europe.

FIG. 240.—*The Telegraph lines across Persia.*

Towns.—No street in all the cities of Persia can be called respectable as Europeans rate structural respectability. Blank mud walls and narrow ill-paved thoroughfares are the rule; the windowed or terraced front of a Persian house is for the inner court or inner precincts of the abode, and not for the world without. Some mosques are handsome, some caravanserais solid, some bazárs highly creditable to the designers and builders; but everything is irregular, nothing is permanent, and architectural ruin blends with architectural revival in the midst of dirt, discomfort, and a total disregard of municipal method.

Tehran, made the capital of Persia in 1788, is situated on a riverless plain at the southern foot of the Elbúrz range. In 1797, Olivier writes of it as little more than two miles in circuit, with a population of 15,000, of which one third belonged to the court or army of the Shah. That it has increased to thirteen times this amount in a century gives evidence that its site was judiciously chosen. But the work of renovation and reconstruction did not begin till 1870, since which year it has been rapidly transformed from a mean six-gated polygon with a frail enclosing wall, to a city of eleven miles circumference with European fortifications and twelve gates. Whatever the estimate of its architectural merits or deficiences in the eyes of European critics, its claim to recently achieved progress cannot be disallowed. The European Legations are situated in summer at and near *Gulhak*, 700 feet higher than Tehran, and 4,500 feet above the sea-level, a locality providing luxurious retreats with grassy and well watered gardens. *Tabriz* (or *Tauris*), the commercial capital of Persia, situated close to the Turko-Persian frontier, was sacked by Timur in 1392, and twice before that period levelled to the ground by earthquakes,

FIG. 241.—*A bit of old Tehran.*

a calamity five times repeated within the last two centuries. Large and important as the place is, there is little to note in it at the present day save the Blue Mosque with its handsome tiles and inscriptions, still visible amid its ruins, the bazárs, and the citadel. *Ispahan*, near the centre of the country, was the ancient capital, and with its suburb *Julfa* where the Europeans live, stands in a fertile plain. Though only a wreck of its former splendour it is still the second city in Persia judged by its commerce. *Mashad*, in the north-east on a tributary of the Hari-rud, is the capital of the province of Khorasan and enjoys a high reputation as a holy city and place of pilgrimage amongst the Shias. *Yezd*, almost in the geometrical centre of Persia, is practically the only residence of the religious sect known as *Gabrs*, who still follow the teachings of Zoroaster like the Parsis of Bombay. *Kerman*, situated far in the interior at an elevation of 5,000 feet, is an important meeting place of trade routes between the Persian Gulf and Central Asia. *Urúmiya* (locally *Urmi*) is situated 4,400 feet above the sea, in the fertile plain of that name, twelve miles west of the great Shahi (or *Urúmiya*) Lake, of which the length is estimated by Lord Curzon at 84, the breadth at 20 to 30, and the circumference at nearly 300 miles. It is interesting at the present day as the headquarters of the (Canterbury) Archbishop's Mission to the Assyrian or Nestorian Christians. *Shiraz* in the south-west, reached by a steep and rugged road from the ports on the Persian Gulf, is the cradle of Persian nationality and the capital of the province Fars which gave its name to the country. Famed for its roses, wine and nightingales, Shiraz is celebrated in the song of the great Persian poets. The chief seaport is *Bushire* on the Persian Gulf; *Linga* and *Bandar Abbas* also do a considerable trade with India and Europe, mainly in British ships, but none has a good harbour.

STATISTICS

(All statistics are estimates, some very uncertain).

Area of Persia in square miles	650,000
Population	8,000,000
Density of Population	12

POPULATION OF CHIEF TOWNS.

Tehran	200,000	Yezd	40,000
Tabriz	170,000	Kerman	40,000
Ispahan	60,000	Urúmiya	40,000
Mashad	50,000	Shiraz	30,000

ANNUAL TRADE *(in pounds sterling).*

(Return of the Ports on the Persian Gulf only, for 1896).

Imports	1,720,000
Exports	1,186,000

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II.—AFGHANISTAN

By Sir George Scott Robertson, K.C.S.I., M.P.,

Formerly British Agent at Gilgit.

Position and Characteristics.—Afghanistan, literally the land of the Afghan, but actually the territory ruled over by Habibula Khan, the Amir of Kabul, is the most eastern part of the great Iran plateau which spreads south-westward from the Pamirs. It may be described generally as a drab-coloured land, one of the waste places of the world. Sand, bare rocks, sterile hills and vast snow-topped mountain ranges are the main features of the stern inhospitable country; tender green places, fertile irrigated fields, vineyards and orchards being circumscribed and infrequent. In summer it is hot everywhere. The temperature depends upon elevation, not upon latitude. Stony, treeless slopes, parched soil and whirling sand increase the heat and dryness of the harsh, scorching air. Burnt grey-brown, the naked landscape quivers in the fierce beams of the sun. Winter brings frost, snow and blustering storms, and in many places dangerous snow hurricanes occur; Ghazni is said to have been depopulated twice by blizzards. The winter is full of surprises. One moment a traveller may, in the Sun's glare, be miserably overheated, the next, in shadow, he is pierced to the heart by the chill of an icy wind.

Roads are mostly rough and hilly or ankle-deep in yielding sand; they are often incredibly tiring. Food is scarce, for the whole country is poor; it yields grudgingly bread for man and herbage for animals.

People and Government.—The people, products of this unkindly soil, are hardy (the weaklings die), stubborn, brave, and so treacherous that the word gains an intensive meaning when applied to them. Towards strangers they are servile or hectoring, the probable result in personal financial profit being the sole rule of conduct. Luxury, even comfort, to them is often what we call vice. Ingenious in sensuality, they are intriguers by instinct, while running through their whole character there is a wonderful arrogance, vindictiveness and cruelty. Born and bred amidst an unceasing struggle with nature for the means of life, they live hard and they die hard. In spite of the rigid, stern and narrow ceremonialism of their Mohammedan religion, Afghans are not fanatical; most creeds are tolerated, the chief exception being Christianity. Hatred of Christians springs less from questions of dogma and faith than because the blood of ancestors and tribesmen cries for vengeance; and because of the supposed determination of the British Christians to enslave the Afghan people and force them to "carry loads." Unlike the grasp of an Amir, which now and again seizes upon an individual while the crowd escapes, British rule is feared as a wrought-iron system regulated by an inexorable screw called "law," which squeezes free hill-men into the pulp of which slaves are made. The government of the country is an extreme Eastern Absolutism

wherever or whenever the different tribes are cowed. Regular authority is based upon the dumb terror inspired by hideous and dramatic punishments. Tribute is oftentimes collected by armed forces after much bloodshed. An Amir of Afghanistan must be merciless, and his people must believe him to be the implacable enemy, secret or declared, of the government of India.

Boundaries.—The peculiar position of Afghanistan, a buffer State lying between the Russian and Indian empires, gives special importance to its boundaries, which have been settled by treaty and delimited on the ground in a highly technical manner. All along its northern border from Zulfikar on the Hari-rud to Wakhi-jui, where the Sirikol, the Hindu Kush and the Karakoram mountains meet together, the Amir of Kabul's territory marches with that dominated by Russia; while on the west the Persian province of Khorasan is profoundly influenced by the officers of the Tsar. Herat, one of the most blood-drenched places in the East (Jenghiz Khan left but forty alive out of a population of a million in 1232), whose history is the history of Central Asia, has been brought within 95 miles of the Russian terminus by the completion of the Kushk river railway. On the projected East Persian railway from Ashabad on the Russian Trans-Caspian line to the Persian Gulf two stations will be at most four days' journey from Herat. As the nearest British outpost, at New Chaman, is hundreds of miles away, this "Key of India," if Herat ever deserved that title, is lost. But in any case it is an ancient and corroded key, useless for the modern steel wards placed in the door-lock at Quetta.

The territory east of Badakhshan and north of the Hindu Kush was formerly the cause of bitter controversy, but since the Russo-Afghan frontier line was laid down in 1894, it has returned to its natural state of drowsy remoteness. The northern border of Afghanistan from Persia in 61° 20′ E. to Chinese Turkestan in 74° 50′, runs jaggedly side by side with Russian territory for 1,000 miles. Zulfikar is in 35° 35′ N., and from that point the line in irregular loops gains the Oxus at Kamiab, which is more than 300 miles from Herat. The frontier then runs up the historic river and its main feeder, the Ab-i-Panja, to Lake Victoria. Its farthest north point is at the top of the Oxus curve (38° 35′ N.) caused by the northward thrust of the great spurs of the Hindu Kush; its most southerly is opposite Chitral where barely ten miles of mountain land divides Russian from British authority. Some 60 miles eastward of Lake Victoria this long-stretched northern boundary ends at a peak in the Sirikol range, which divided the Chinese from the Little Pamir and not far from Wakhi-jui, the joining place of mountains.

The south of Afghanistan is bordered by tracts controlled actually or nominally by the government of India. The boundary should be drawn in crimson, for blood has been lavishly shed to mark it out. From the Sirikol mountains the wavy line keeps a south-westerly course for 900 miles, until at a spot south-west of Quetta (29° 50′ N.) it alters to nearly due

west, being carried across the great arid desert common to southern Afghanistan and western Baluchistan. At first this boundary follows the crest of the Hindu Kush as far as the lofty Dorah and Mandal Passes leading to Chitral and Kafiristan respectively. It then runs along the eastern watershed of the Bashgul valley of Kafiristan which separates that country from Chitral. Passing over the Chitral river just below the village of Arnawi, and, still upon a mountain range, the line borders the Kunar valley on the east, and crosses the main road between India and Kabul west of the Khaiber Pass nearly 40 miles from Peshawar. Next, by the aid of the Safed Koh mountains, it forms a western triangular out-thrust bringing the Kuram valley into British territory. Thence the frontier marks traverse the territory of wild tribesmen more than 100 miles west of the Indus, and at the latitude of the British frontier outpost of New Chaman, which is half-way between Quetta and Kandahar, that distance is doubled. From the Quetta district the remainder of the southern boundary towards Baluchistan is over desolate wastes of sand, for some distance parallel to the Helmand, the only considerable river of its latitude between the Tigris and the Indus. The western or Persian frontier, about 450 miles long, starts in 60° 50′ E., and after running through the great Seistan swamps, where the Helmand river ignominiously terminates, it turns northward again, and with little further variation limits Persian Khorasan and passes with the Hari-rud river to Zulfikar.

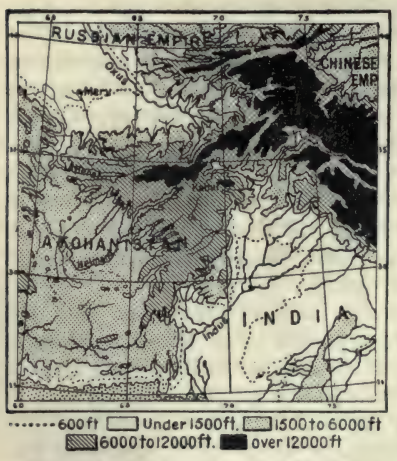

FIG. 242.—*Configuration of Afghanistan and the Pamirs.*

Surface and Communications.—The lowest elevations to be shown in an orographical map of Afghanistan as under 4,000 feet would be the Kabul valley at and below Jelalabad, and all the country south and west of a line drawn between New Chaman and Herat; the highest parts (over 7,000 feet) of the Afghan plateau are great tracts just west of Kabul and south of Ghazni. Far from the sea, Afghanistan is difficult to enter; where huge mountain chains and toilsome passes do not hinder the traveller, there appears heartbreaking sand which, in the south-west of the country, is swept during summer by a deadly hot wind. Two of the chief trade roads are those from Mashad and from Bokhara to Herat, the centre of a well irrigated and richly cultivated district, which is connected with fanatical, unruly Kandahar by a main highway of commerce touching at Farra and crossing the Helmand river at Girishk. There is traffic

between Bokhara and Kabul by way of Balkh (Bactria, the mother of cities) and by Khulm. Chief of all the caravan routes is the grim Khaiber Pass, naked and savage, two marches west of Peshawar, the terminus of the Indian railway system, and a famous bazár for Central Asian fabrics. This historic pass has resounded to the clangour of every great invasion of India, except that of Alexander, who passed it to the north, until the West sent its stubborn warriors up from the sea. It is held by sections of the Afridis who have blackmailed every Indian dynasty for centuries. They periodically exact a tribute of slaughter from the Indian government in addition to the customary tale of isolated murders; but the passionless grasp of British authority is closing upon them inexorably. *Kabul*, a sorrowful name to the British, 190 miles west of Peshawar, stands on the Kabul river nearly 6,000 feet above the sea. There lives the despotic Amir; its narrow winding streets are blocked with the picturesque *kafilas* of Oriental merchants. It has modern arsenals and a gun factory; but all Afghanistan is of political rather than of commercial interest. The Gomal Pass, the main traffic road between the Panjab and Ghazni, is held on both sides by ruffianly Waziris. To it the merchant adventurers from near Ghazni fight their way annually, then lay down their arms and trade peaceably in India, to return and resume their weapons and fight their way home again before the end of the year. Still further south is the Bolan Pass, through which the railway runs to Quetta and New Chaman. New Chaman, the furthest British military post, is about the same distance from Kandahar (80 miles) as the Russians are at present from Herat. A trader's road leads down the Helmand valley to Persia from *Kandahar*, a square walled city with a history remarkable, even in Afghanistan, for hatred and strife. Thither all western roads lead, making it hardly less important as a guardian of commerce than it is as a strategic fortress.

Tribes.—The Afghan State comprises tribes great and small, mixed with odd fragments of peoples, the whole loosely held together as a cementless Afghan field-wall is held together, wonderfully but precariously. First comes the great dominant tribe of the *Duranis*. Next, the ferocious *Ghilzais*, a Turki people with traditions of past ascendancy, who exterminated the British force retreating from Kabul in 1842. Then follow *Aimaks* and *Hazaras* of Tatar blood, Iranian *Tajiks*, *Hindkis*, *Jats* and the mixed folk of the towns. The *Usbeks* of Afghan Turkestan were not one people, but a confederation of numerous Turk and Tatar tribes. Less numerous are *Persians*, transplanted from their native land in the eighteenth century, *Arabs*, *Jews* and derelicts. Finally come the *Kafirs*, the interesting non-Moslem people of the Hindu Kush who, after centuries of savage freedom, were subjugated by the Amir of Kabul in 1895. They are probably the descendants of tribal fugitives from eastern Afghanistan, hurled forth, like sparks from the anvil, by the fervid swordsmen of Islam eight hundred years ago. Descending, no doubt calamitously, upon the feeble folk inhabiting the trackless slopes and perilous valleys of modern

Kafiristan—themselves possibly prehistoric refugees before a stronger people—these fugitive pagans, aided by the terrible difficulties of their country, maintained themselves in a state of chaotic independence against all the fanatical crusades of the surrounding Mohammedans, until Abdur Rahman, the great king of the Afghans, brought them under his stern discipline.

The statistics of Afghanistan are mere guesses, as no accurate survey has been made, nor any attempt at a census.

STATISTICS.

(Approximate Estimates.)

Area of Afghanistan (in square miles)	250,000
Population	4,000,000
Density of population per square mile	16
Population of Kabul	140,000
" Kandahar	15,000 to 100,000
" Herat	12,000
" Ghazni	3,000 to 10,000

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CHAPTER XXVI.—INDIA AND CEYLON

I.—THE EMPIRE OF INDIA

By Sir Athelstan Baines, C.S.I.

Name.—The earliest people of whose migration into the country we are now in the habit of calling India we have any historical knowledge entered by the north-west, and gave the name of *Sindhu*, the "flood" or "ocean," to the first great river which obstructed their southward progress. In the mouth of the Irán, or Persians, their kinsmen and rivals, the initial *S* was softened into *H*, and the Greeks, who became acquainted with the country through the Persians, dropped, in their turn, the aspirate, calling the frontier river the Indus, and the country beyond it, India. Their example was followed by the early geographers and travellers of the West, and from them the name has descended to our day. It has never been recognised, however, by the inhabitants of the country itself, who continue to make use of their various racial and topical terms, restricting the modern Persian *Hindustan* to a comparatively small tract in the north-west of what Europeans know as India. The later and more comprehensive title, accordingly, may be taken as connecting the sphere of British rule, by which a mere geographical expression has been converted into a definite political unit.

Position and Extent.—India extends from Mekran, in the west, to the Mekong in the east; from Cape Comorin, in the south, to Kashmir and the foot of the Pamirs in the north. By latitude it would stretch from Algiers to the Gold Coast, or from Venezuela to North Carolina, whilst from west to east it extends over nearly forty degrees of longitude. It may be roughly described as a triangular peninsula, lying almost wholly within the tropic of Cancer, surmounted by a larger continental region, with considerable extensions east and west, beyond the base of the peninsula. The coast-line of the latter, in spite of its length, is singularly devoid of indentations, except at the mouths of the larger rivers and towards the northern portion of the west coast. The only harbours accordingly, except for light-draft vessels, are found a little way up the deltas of the chief rivers, or where, as at Bombay, a group of islands affords adequate shelter from the open sea. The eastern coast, in particular, is provided with little more than a few imperfectly protected roadsteads. The southern portion of the west coast is distinguished by a series of backwaters, or lagoons, parallel with the coast, and affording a safe and convenient waterway for small vessels, when the season of high winds makes the ocean unnavigable.

The Himalaya.—Although India is so sparingly provided with natural facilities for maritime commerce, it is remarkable that from the earliest times of which we have records, all peaceful intercourse between that country and the rest of the civilised world has been by sea, whilst, with the single exception of the British occupation, which was due to naval supremacy, all hostile invasions have been by land ; and this, in spite of the immense mountain barrier on the north, which constitutes the principal feature in the configuration of India. This mountain system cannot accurately be termed a chain, consisting as it does of several parallel and converging ranges, intersected by enormous valleys and extensive tablelands. The nucleus of the system is situated just beyond the Indian frontier, in the region known as the Pamirs, or locally, as the "roof of the world." From this centre to the high land round the sources of the Irawadi, in the east, an unbroken wall of mountains extends along the north of India, pierced only by passes from 17,000 to 19,000 feet above the sea, overtowered by peaks reaching an elevation of from 23,000 to 29,000 feet. The latter is the culminating point of the Earth's surface at present ascertained by scientific means. The Himalaya thus constitutes a continuous wall, which, if transported to Europe, would link Cader Idris with the Caucasus. Flanking ranges are thrown out from the main mass into Burma on the east, and Afghanistan on the west (Fig. 242). They are of comparatively small elevation, however, and are traversed by many passes, presenting no insuperable obstacles to traffic. It is through these cracks in her armour that India has been from time immemorial subject to invasion from the north-west, and Burma from the north. This rampart is also of physical importance to India, for it exercises a powerful influence on the climate and rainfall.

FIG. 243.—*Configuration of India.*

The Plains.—Immediately below the Himalaya lie the plains of the great rivers of India, the course of which determined, in prehistoric times, the direction of the earliest civilisation from west-central Asia, as to which we have still only the shadowy and mythological traditions of Brahmanic writings to inform us. Of these rivers, two main streams and two affluents

take their rise to the north of the Himalaya, and all four, strangely enough, from within a comparatively small lacustrine district between the main range of the Himalaya and the tableland of Tibet. The *Indus*, after a north-western course, bursts through the mountains at an acute angle, collects in a deep and rapid stream the tributaries which give their name to the Panjab, or "land of the five rivers," and ends by performing for the great province of Sindh, so called from its chief feature, the office which Egypt owes to the Nile. The *Satlaj*, rising south of the Indus, joins the latter, after a very short course to the north of the Himalaya, and a long one through the Panjab. Starting due east from its source, the *Sanpu* enters Assam, at the extreme north-east of India proper, bends sharply south and west until free from the mountains, and finally, under the name of the *Brahmaputra*, mingles its turbid waters with those of the Ganges in the innumerable channels of the great Bengal delta. The third great river alone rises south of the Himalaya, and though popular tradition and practice must be accepted, and the stream of the combined *Jamna* and *Ganges* be held to be the main contributary to the sacred river known by the latter name, it appears that the volume of the tributary which rises on the north of the range, known as the *Ghogra*, entitles it to that honour. The richness of the two great rivers, the Ganges and the Brahmaputra, in fertilising silt, is the making of lower Bengal, and the amount deposited every year is estimated at not less than 40,000 million cubic feet, enabling the cultivator to dispense with manure of any sort over the inundated area. Similarly, Sindh and the north-west of India are the gift of the Indus, for, though the inundation fertilises only the lower part of its course, the canals which take off from the upper, render cultivation possible where rain is too sparse to be of material aid to it.

The Vindhyas and the Dekkan.—The great plains are separated from the rest of India by a belt of hilly, rather than mountainous, country, running, at different elevations, from coast to coast. The country rises slowly from the Gangetic valley to the plateaux of Central India, edged by the *Vindhya range*, below which, on the south, the *Narbada* river seeks the Gulf of Cambay. Parallel to that range runs the *Satpura range*, similarly bounded by the valley of the *Tapti*. Eastwards the country is more broken, the plateaux smaller, and the wide but irregular belt of hills ends in the neighbourhood of the Bay of Bengal, after giving birth to only one river of considerable size, the *Mahanadi*. On the west, the large plain of almost rainless country called the Indian desert, divides the tablelands of Central India from the valley of the Indus and the small peninsulas of Kachh and Kathiawar.

The core of the peninsula proper is the Dekkan Plateau. This may be said to begin from the southern edge of the Tapti valley. Its limits are well defined on the west by the range called the Sahyadri, or *Ghats* (steps), from their abrupt rise out of the strip of coastal plain, which extends, with varying breadth, to the extreme south of Malabar. In like

manner, the plateau ends abruptly in the south in the mass of the *Nilgiri*, or Blue Mountains. The surface slopes gradually from the top of the Ghats to the eastward, and finally subsides into the flat coast of the Bay of Bengal. A broken line of hilly country runs parallel with the coast from the Central Belt southwards, to which the name of the *Eastern Ghats* is sometimes given, though it possesses none of the special features of the western system bearing that title. The Dekkan is traversed by two principal rivers, the *Godavari* and the *Krishna*, rising in the Ghats and falling into the Bay of Bengal. To the southward the *Kavari* seeks the sea after a short passage through the southern portion of Mysore and south of Madras. No stream of importance enters the Indian Ocean south of the Tapti, and the almost unbroken chain of the Ghats makes the uplands of the Dekkan difficult of access from the coast, except by a few passes through which roads have been made by the British. The south-east of the peninsula, on the other hand, is a comparatively level plain, of great fertility everywhere within range of the waters of the river deltas

Burma.—Finally, the province of Burma consists, first, of the coast line from Arakan to Tenasserim, broken only by the delta of the Irawadi and the bay formed by the mouth of the Salwin river. North and east of the Irawadi the country is hilly and thickly covered with forest as far as the borders of Assam and Bengal on the west, and the frontier of China and Siam on the north and east. The *Irawadi* attracts the population and commerce of central and upper Burma, leaving a fringe of semi-civilised tribes on each side.

Geology.—The geology of India determines the general characteristics of the main divisions specified above. So far as the *Himalaya* have been explored, they appear to contain three systems, chiefly of gneiss mixed with mica-schist in the more northern portion, and with syenite and granite in two bands in the central range. In the lower ranges to the south, the beds are often found inverted, with old gneiss overlying sedimentary rock. The sub-Himalayan system of later Tertiary, includes the Siwalik formations, well known for their remarkable deposits of fossil mammals. In the Salt range of the western Panjab, which is in some respects a continuation of this region, a uniform succession of formations from Silurian downwards is found. The two great river-systems of the Indus and the Ganges are separated by no marked ranges, and the rise from the sea-level to the watershed is very gradual, a slight change in elevation would suffice to turn the upper waters of one into the other. Such changes have probably occurred in times past. The *Plain*, as a whole, belongs apparently to the Eocene period, antecedent, therefore, to the formation of the Himalaya, which was upheaved in later Tertiary times. The close resemblance, however, in the outline of these two geographical features, seems to indicate that the depression of the plain is related to the upheaval of the mountains. The *Central Belt* of

hilly country shows three systems of gneiss, overlaid with transitional rock succeeded by the Palæozoic, possibly pre-Silurian, formation of the upper and lower Vindhya, from which the older rock is sharply demarcated towards the east, but less well defined westwards. The sandstone and shale of this formation is remarkable for its entire freedom from fossils. On the other hand, the Gondwana series eastward and southward of the Vindhya, contains vegetable remains of considerable interest and value, while the portion towards Bengal ends in the coal-bearing strata known as the Damodar series. The series is interesting, too, from its containing marks of glacial action, which one would not expect to find at comparatively low elevations within the tropics. The greater part of the *Dekkan* is occupied by the basaltic formation of the Cretaceous period, known as the Dekkan Trap, some of which is more than 6,000 feet thick. The denuded edges of the flows form some of the most prominent hill ranges, and the scarped tops have been, from time immemorial, utilised, with the aid of a few wings and flanking walls, as forts of vast extent, and, in the days of short-range artillery, of no inconsiderable strength. The disintegrated basalt, weathered out, forms the fertile black soil to which the Dekkan owes its repute, in parts, as a cotton and wheat-growing tract. From the point where the Ghats approach the sea, on the west, the basalt is fringed, and in some places overlaid, by laterite, and the same feature is found also along the greater part of the east coast, south of the Mahanadi delta.

In *Burma*, the early Tertiary prevails in Arakan, or along the northern coast. Between the Irawadi and the Sittang rivers the formation changes to Miocene, with fossil vegetation of probably the Pliocene or newer Tertiary, in the western portion of that tract. Tenasserim differs from the rest of Burma in its formations. In the north is the lower Carboniferous; in the centre, Silurian; and in the south, probably Tertiary, and also coal-bearing.

Minerals.—The mineral resources of India, although of little importance in comparison with those above ground, are not scanty. Coal exists in large fields in the Damodar valley of western Bengal, where it is in good demand for the railway; in the Narbada valley it is being worked for local use; there are fields too in the hilly country of Chutia Nagpur, south of the Ganges valley, which have not yet been fully explored, and finally, attention has been directed to a supply in the South Godavari valley. Beyond this, the peninsula is coalless. Small fields of excellent quality, however, have been lately discovered and worked in the far north-east of Assam. Iron is found in considerable purity in the coal-bearing tracts of Bengal, and near Salem in the Madras Presidency, but it is little worked because of the want of limestone within easy range for smelting. Gold exists in small quantities in the valleys of the Himalaya and the Central Belt, where it is washed by a few of the lowest classes. In Mysore it is more plentiful. Tin is confined to the

south of Burma, and copper and lead chiefly to the Himalaya. The plains of North Bihar yield a good deal of saltpetre. Salt is both dug from the rock in the western Panjab, and obtained by evaporation along the coasts and from the brine lakes in Rajputana. Rubies are still found in a small tract in Upper Burma, but the diamond of India, though known to legend, is now scarcely extant. Petroleum, the use of which for lighting and lubricating has largely increased in India during the last twenty years, is found chiefly in Burma, upper Assam, and parts of the Panjab, but does not yet compete successfully with the imported supply.

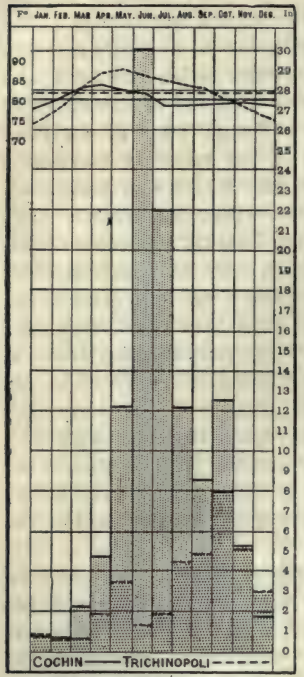

FIG. 244.—*Temperature and Rainfall of Cochin and Trichinopoli.*

Climate.—The peninsula lies wholly south of the tropic, whilst the continental portion of India stretches nearly 14° to the north of it. The range of temperature is accordingly very wide. (See isotherms of Asia, Figs. 228, 229, 230.) Along the coasts it is high but equable throughout the year, and the air is charged with moisture. Inland, the plateaux show a wider annual range, and are dry and hot during one part of the year, dry and cold during another, with a comparatively short interval of warm wet weather. Except along the coasts, therefore, the mean annual temperature is a meteorological figure of little significance in the life of the people, and the extreme range between the mean of the warmest and of the coolest month is a factor of importance. This range, in upper Sindh, is as great as 30° F. in the year; in the Panjab, 27°, and in the Dekkan, 25°; whilst in Calcutta it is but 16°, falling along the west coast to 12°. The variations in the annual rainfall are still more remarkable. Throughout India the fall is periodic, and the prevailing influence is the air-current, or monsoon, which sets in from the Indian Ocean about May, lasting until the middle or end of September. The direction of this air-current, determined by the updraught caused by the heated surface of the continent, is from the south-west. Its strength appears to depend to a

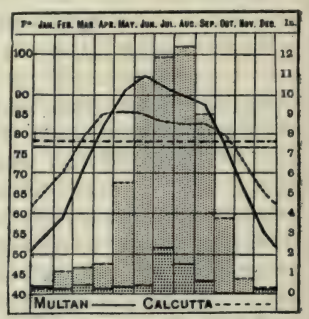

FIG. 245.—*Temperature and Rainfall of Multan and Calcutta.*

considerable extent upon the snowfall upon the immense mountain system of the north, the cooling influence of the heavy fall tending to weaken the force of the moisture-bearing wind as it approaches the wall of the Himalaya, which bars its further progress. Before reaching this, however, it has to encounter the serious resistance of the Ghats, directly across its main direction, depriving it of a considerable proportion of its moisture in favour of the coast strip, to the detriment of the highland of the Dekkan immediately to the east of the impediment. Access to the plains of the southern part of the Gangetic system is afforded by the wide valleys of the Tapti and Narbada, and the main air-current, which does not reach the plains of north-western India direct, is deflected and condensed in its attempt to surmount the almost vertical expanse of from 5,000 to 14,000 feet of perennial snow presented by the Himalaya. A second branch of the same air-current, however, finds its way up the Bay of Bengal, and, after bestowing a plentiful watering to the low-lying fields of the great Delta, and on the plains of Lower Burma, meets the Assam range of mountains in full force, resulting in an annual fall of little less than 500 inches, and establishing on one occasion the "record" fall of 805 inches. Later in the year, a sort of reaction sets in, and this part of India receives the downfall of a north-eastern air-current, which extends along the east coast nearly to Cape Comorin, supplying the deficiency left by the exhaustion of the south-western monsoon in its course over the Dekkan plateau. In the north-western corner, again, the same result follows in the winter months over the Panjab and the upper Jamna and Ganges valleys, but the air-current is slight and local. Thus the central plains of both continental and peninsular India lie on the edge of the air-currents, and are liable, accordingly to receive too little rain whenever any of the

FIG. 246.—*Rainfall of India during South-West Monsoon.*

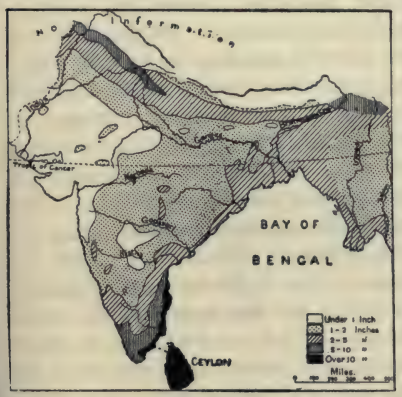

FIG. 247.—*Rainfall of India during North-East Monsoon.*

winds is of less than the average strength. To these tracts the name of Zones of Uncertain Rainfall is given, and it is here that the liability to famine is most marked. In contrast to the meteorological conditions prevailing in north-eastern India, the western portion of the continental division of the country is all but rainless, and cultivation has to depend entirely upon artificial irrigation beyond the reach of the annual inundation of the Indus, due to the melting of the snow on the Himalayan sources of the main stream and its large tributaries. Thus, the annual range of temperature varies inversely as the rainfall, and the two together exercise an important influence on the general social and economical development of the population.

Flora.—The exceptional power of this climatic influence in India depends on the fact that the natural resources are principally on the surface of the soil, and to a comparatively small degree in its depths. From the earliest ages, agriculture has been the hereditary and traditional occupation of the great bulk of the population, and at the present day about three-fourths of the inhabitants of India are directly dependent upon it. To provide for the subsistence of nearly three hundred millions, all the more fertile plains and much of the less favoured tracts have been gradually pressed into the service of man. The forest wealth, accordingly, which is considerable, has been gradually restricted to the broken and hilly ground in Central India, along the chief mountain ranges, and in the river valleys of Burma. There the more valuable timber-producing tracts have been taken under the protection of the State and administered as profit-yielding estates. Elsewhere, with due regard to the demands of the population for coarse timber and firewood, as well as to the climatic influence attributed to forests, areas under vegetation are protected against the reckless destruction habitually wrought by the Indian peasantry. Of the timber of India the most widely used is the teak (*Tectona grandis*), the best of which is found in the forests of Lower Burma and along the Ghats, from Kanara to Travancore. It flourishes, too, though on a smaller scale, throughout the western portion of the Central Belt of hills. Along with the teak may be mentioned the sandal and blackwood (*Sissu Dalbergia*), more useful in ornamental work than as timber, but in their way, of equal value. The place of the teak is taken in the east of the Central Belt and along the northern parts of the Gangetic valley, by the sal (*Shorea robusta*); in the Himalaya, by the deodar and other cedars; and in the western ranges, by conifers of larger growth. Various kinds of oak also flourish at elevations over 5,000 feet from the Panjab to Bhutan. In the dry tracts of the west, little but a few varieties of hardy acacia and tamarisk can withstand the long periods of drought. The marshy region of the Gangetic delta, on the other hand, has developed its own growth in sufficient luxuriance to supply the markets of all the adjacent country, as well as the metropolis. Midway between the extremes, the forests of Assam and Malabar present typical pictures of the rich and varied vegetation generally associated with

the tropics. There are three kinds of tree which, though useless as timber, are more widely distributed than any of the above, and of incalculable popular utility. First, the bamboo, which attains its largest growth in the damp forests of Assam, Burma, and the Ghats, but which is seen to some extent even in the upland regions. Secondly, the mango, the most popular fruit tree of the country, and finally, the large and varied class of palms, including the coco-nut, which fringes the western coast from Bombay to the southern point of Ceylon, the palmyra of the more northerly tracts of fairly heavy rainfall, and the various date and other palms of the dry tablelands and the upper Ganges valley. In some tracts the house and nearly every domestic utensil is made of bamboo. In others several of the lower labouring classes trust largely to the fruit of the mango for food between the harvests. The palm tribe supplies matting from its crown of branches, fruit from the coco-nut, fibre for mats and ropes from the husk. The palmyra provides an effective thatch against the heavy rain, whilst nearly every palm supplies a plentiful outpouring of juice, used fresh, as a morning stimulant, or fermented, as an evening consolation.

Animals.—Of the animals of India, the first place must be given to horned cattle. Except in the desert and Sindh, where the camel predominates, and in the damp climate of the deltas and parts of the coast, where the buffalo thrives, all field operations requiring draught labour, and the whole of the transport by road are done by the various breeds of humped cattle ; and milk being one of the most important articles in the diet of an otherwise almost vegetarian peasantry, the cow is seldom absent from even the poorest household, and is well entitled to rank as the sacred animal of the Brahmanic religion. The horse is found in general use, though for riding only, in the west of the continental part of India, in the Dekkan, and in Burma and its neighbourhood. A very fine breed of the wild ass is still extant on the salt plains of western India, though in very small numbers, and the domesticated variety, though numerous enough, is relegated to the humblest duties, and shows no sign of rising in either breed or estimation. The sheep is kept chiefly for its wool, and the most prevalent variety is probably of foreign origin. In the Himalaya alone wild species of great size and remarkable spread of horn are found, affording much labour and interest to adventurous sportsmen. The elephant is found wild in the hills of the north-east, and in parts of the forest land of the south-western Ghats. It can now only be caught under the license of the State, and, except for purposes of pageant at the courts of native chiefs, its use is principally confined to draught and transport in military operations. In the forest tracts of Burma, however, and in Assam, it is almost a domestic animal.

Of the purely wild animals of India, the tiger is the best known, and is found in most wooded tracts, though in greatest abundance in the sub-Himalayan forests, the marshes of the Gangetic delta, and the hill

country of Central India. With its smaller but more plentiful relative, the panther, it is responsible for the death of about 1,200 human beings and over 60,000 cattle per annum, in the British provinces alone. The various kinds of snakes, viperine and colubrine, kill about 20,000 persons and 4,000 cattle every year. The lion is now extinct except for the almost maneless variety found in small numbers in the southern hills of the peninsula of Kathiawar. The only small wild animals that need be mentioned are the jackals, because by them, along with their feathered compeers, the kites and vultures, and their subterranean allies, the termites, erroneously called white ants, the work of the scavenger, which would otherwise be left mainly to atmospheric chance, is rapidly and efficiently performed.

Races of People.—In no equal area is there found a population of nearly 300 millions divided to such an extent into distinct and independent communities, owning no brotherhood of religion, language, race, or social intercourse. A false impression of homogeneity is sometimes received by assuming that race in India is co-extensive with creed, and that the titles of Hindu and Musalman, accordingly, denote distinct races. Thus, the three-fourths of the population called "Hindus," are held to be a solid mass, indigenous to India, while all others are foreign. The term Hindu, however, is not, any more than the word India, recognised by the people themselves; it is simply a comprehensive way of grouping the almost innumerable sects and communities which do not profess a more definite creed, but which have adopted a certain system of social organisation based upon the supremacy of a priestly caste, the Brahmans, and it includes many different races within the fold.

The race basis of Indian society is to-day, as it was in the dawn of history, a short, swarthy, and stalwart population, the origin of which is unknown. Its direct and probably pure-bred descendants live in the hills and forests of Central India, the north-east coast, and among the mountains of southern India, under numerous tribal designations, but similar in life, customs, and types of language. Traces of their blood run through all the population of the open country, though disguised by the lapse of many generations of different physical and economical conditions. The first dispossession of these dark races of which we have any record, was by some fair-skinned tribe calling themselves by the generic title of *Arya*, from the west of Central Asia. They occupied the great plains, enslaving the dark races or driving them to the hills. The northern peninsulas of Kachh and Kathiawar, on the west coast, Berar and parts of the Dekkan, as well as Orissa, on the east, were also colonised by this race, but it does not appear that they established themselves in force further to the south or east, and in the present day it is only in the upper Ganges valley, in Rajputana and the north-western coast of the peninsula, that a comparatively pure Aryan stock is to be found. Following upon the immigration of the Arya,

and within historic times, other races of Central Asia, known to the Greeks as Scythians, sweeping down from the north, have left their mark on the population of the Panjab and its vicinity. Similarly, the valleys of the Brahmaputra and Irawadi have respectively been the guiding lines of immigration from eastern Asia, but the Mongoloid tribes of the north-east did not penetrate as settlers far beyond the outer fringe of the great plains, and found a congenial resting-place in Burma and Siam. The yellow type, with the obliquely-set eye and high cheekbone, dominates the whole of the southern slopes of the Himalaya, as well as the interior of the great mountain system, and has left traces in the population of eastern Bengal. In Burma, as in India proper, a squat, dark race has been displaced and driven from the plains to the hills and forests by a northern invader of superior civilisation. All these races profess religions which, whether Brahmanic, Buddhistic, or of more primitive type, are indigenous to India. Of the imported forms of faith only the smaller, such as the Israelite and the Parsi, are co-extensive with a race distinction, the rest, such as the Christian and the Musalman, having been chiefly recruited within India itself. The *Parsi* community, though spread in small numbers nearly all over the country, is mainly domiciled in and to the north of Bombay, and numbers but 90,000 souls in the whole empire. Of *Jews* there are three small communities, two of which have, in course of time, assimilated much native stock. All of these, again, are denizens of the west coast. The 2¼ millions of Christians comprise over two millions of Indian converts, of whom 1¼ million are the descendants of those baptized by the Portuguese of the 16th century; about 160,000 are Europeans, and the rest of mixed breed. The invasions of Upper India from the north-west have left behind them a fair sprinkling of Afghan and Moghal blood, especially on the frontier and round the former capital cities of Delhi, Lahore and Lucknow. But the bulk of the 60 million Musalmans consists of local converts from the system loosely known as Hinduism, and the titles assumed by many, implying an Arabic or Moghal origin, bear no relation to actual descent.

Languages.—The influences which merged race in race and largely reduced religious systems to the semblance of a few uniform creeds have not availed to break down the barrier of diversity of language, which, with the system of caste, keeps apart the chief communities of India. Here, again, comprehensive classification tends to leave a false impression of uniformity. For instance, the group of languages which from their structure and vocabulary are included under the general title of the "inflectional" or Indo-Aryan type, comprises more than three-fourths of the population, but the sixteen or seventeen main items into which the group is subdivided, such as Hindi, Bengali, Marathi, Gujarati, Panjabi, &c., represent tongues so different that the communities which use them are unintelligible to each other. It is the same, in a less degree, with the fifth of the population speaking Tamil, Telugu, Kanarese, and other

languages of the Southern, or Dravidian, "agglutinative" type, and in a still greater measure with the comparatively small group of the more markedly agglutinative tongues known as the Tibeto-Burman. Speaking generally, the last family is restricted to the north-eastern Himalaya and Burma. The Indo-Aryan family holds the north-west, the great plains, the deltas, and the west. The whole of the south is Dravidian, whilst between this group and the Aryan comes the small agglutinative class of tribal tongues conveniently known as Mundari. Hindi with its dialects is the mother tongue of some 100 millions, Bengali of 45, Telugu of 20, Marathi of about the same number. Then comes Tamil with 16, Panjabi with 18, Gujarati 9, Kanarese 10, Uriya 9, and Burmese with 7 millions. The Mundari family is dying out in favour of Hindi, and now prevails amongst about 3 millions only.

Political History.—Up to the establishment of British rule the history of the country is mainly that of the successive domination of the different races or sections of the people over each other, tempered with the sometimes short and sharp experiences of foreign invasion from the north-west, entailing a reconstruction of the political map with almost kaleidoscopic rapidity and completeness. The introduction of the Aryan element at an early period was the result not of invasion, but of gradual occupation and expansion, covering many generations, and its social and religious system is the product of India itself. The historic acquisition of the Panjab, about 500 B.C., by Darius I. of Persia, and the subsequent overrunning of the same tract by Alexander the Great, in 323 B.C., left no trace behind them. Shortly after the departure of the Macedonians, a strong man arose, by name Chandragupta, who laid the foundations, afterwards largely extended by Ashoka, his grandson, of an Indian Empire. The personal element, as in all Asiatic monarchies, was the keystone of the edifice, and in a short time the outskirts of the kingdom fell away. The more important of the foreign invaders who succeeded were evicted after a few generations of power by Indo-Aryan chiefs from the Gangetic plain, or were gradually absorbed into the Brahmanic system. The south of the peninsula never fell to either Aryan or Scythian domination, but the dark races assimilated the teaching and religion of the higher race, which approached them as missionaries and advisers. The next period of political importance is that of the invasions of the Musalmans of Afghanistan from the tenth century after Christ. At first little attention was paid to permanent occupation. Then, Jenghiz Khan passed, ravaged, and retired. Timur did little more, but left a claim which his descendant, Babar, made good, establishing on it the Moghal Empire, which, at its height, extended to the southern limits of the Dekkan. The great administrative ability of Akbar, the contemporary of Queen Elizabeth, made the Moghal control effective throughout his domain, but, as in all Oriental rule, the limbs were loosely knit to the trunk ; the central power decreased with distance from the Court at Delhi, and the Emperor's deputies one by one asserted inde-

pendence. Continual religious persecution welded the Sikhs, originally no more than a dissenting sect of Hindus, into a military and political community of the best fighting material in the country, and when a suitable leader was found in Ranjit Singh, the Panjab beyond the Satlaj was detached altogether from the throne of Delhi. Long before this, however, the rule of the Moghal had been almost destroyed by the upheaval of the Maratha race in the western Dekkan. The warlike and predatory instincts of this people were directed towards a common object by the strong man of the moment, Shiwaji, to whose standard the men of the Ghats and plains alike rallied to overrun India from Tanjore to Delhi, and to establish States under their own chieftains from Kathiawar in the west to Orissa in the east. There then set in the old tendency to disintegration. Chief intrigued against chief, and shifting alliances were formed and broken, reducing the land to chaos. Early in the eighteenth century, the rival local chiefs began to depend less on combinations amongst themselves than upon the co-operation of the English or French settlements on the coasts. The departure of the Europeans from a policy of purely commercial development to the participation in Indian dynastic struggles was initiated by the French; but whilst the hold of that nation on southern India waned, that of the British was gradually extended from the coast into the interior, as the Maratha and Moghal authority fell to pieces. From an ally to be made use of in local disputes, the British grew to be the arbiters of the differences in which those disputes originated, and proceeded to the position of pacificator general, and, finally, of paramount ruler throughout the whole of the peninsula and the greater part of the Ganges valley. It is a remarkable fact, worth noting in connection with this aspect of the geography of the country, that with the exception of the chiefs of Rajputana, Kathiawar, and the Malabar coast, not one of the principal States of India is ruled by a dynasty native to it. It must also be borne in mind that, with the same exceptions, most of these States are only the mushroom growth of the closing years of the eighteenth century, when the whole of India was in confusion almost amounting to anarchy. Thus, throughout the greater part of India, the political history of the last century and a half has been practically that of the replacement of a precarious and recent domination of foreign Asiatics by a stronger and more enduring control by foreign Europeans. Setting aside accretions of territory within the confines of India proper, the British Indian Empire comprises important acquisitions by conquest during the latter part of the nineteenth century, such as the Panjab, Sindh, and the two sections of Burma, while the political, as distinguished from the administrative, frontier of India has been extended by negotiation, or assertion of a "sphere of influence" over parts of the wild country on the confines of Burma and China, over the frontier of semi-independent territory between India and Afghanistan, and over Baluchistan and the adjoining Mekran coast. The mutiny of 1857 led to the transfer of the administration of India from the Honourable East India Company to

the British Crown in 1858, and in 1877 India was declared an **Empire.**

Government.—The link between the authority exercised in the Indian Empire and that vested in the Sovereign and the Government of the United Kingdom is the Secretary of State for India, a member of the British Ministry, aided by the Council of India, consisting of civil and military officers, lawyers and merchants, all having long experience of India in their different capacities. Whilst exercising a general supervision and control over the administration, the Secretary of State is the sole responsible adviser of the Government of the day on all questions concerning India with which that Government is called upon to deal. The actual government of the Dependency is conducted by a Governor-General, conventionally, though not legally, entitled the Viceroy, who is aided by a Council of civil and military officials, in Calcutta or Simla. A survival of the time when British power was confined to the peninsular coasts, and when communication between distant parts was difficult, is found in Madras and Bombay, the heads of which, with their Councils, are still appointed, like the Governor-General, directly by the British Government. The more recent acquisitions, such as the Panjab, the upper Gangetic valley, known till 1901 as the North-West Provinces—a survival of the early days of British rule—recently changed to the more appropriate title of the United Provinces (Agra and Oudh), the newer province of Upper and Lower Burma, together with the older province of Lower Bengal, are under Lieutenant-Governors. The smaller divisions of British territory, Assam, the Central Provinces, Coorg, Ajmer and Berar, and the North-West Frontier Province, separated from the Panjab in 1901, are administered by a Chief Commissioner immediately subordinate to the Central Government. The supreme legislative authority is vested in the Governor-General, who, for the purpose of framing laws, appoints, under various systems of nomination and election, a number of local advisers from the provinces, as additional members of his Council. For administrative purposes each province is subdivided into districts of unequal area under a single officer. In all there are 250, with a mean area of just under 4,000 square miles, and an average population of nearly 900,000. The extremes, however, range from Simla, with only 100 square miles, to a frontier district in Upper Burma, with 19,000, and from a population of 19,000 on the coast of Burma, to one of nearly 4 millions in Maimansingh, near the apex of the great Bengal delta. The main feature in the administration is the insignificant proportion borne by the European element to the native throughout the far-reaching and elaborate system under which a vast and illiterate population is developing its own civilisation, protected, but not directed, by foreign authority. Taking into account the 75,000

FIG. 248.—*The Star of India, the Badge of the Indian Empire.*

British troops and all the professional and mercantile population of that race, the proportion is one Briton to 3,000 Indians. In the service of the State, irrespective of the 800 British officials occupying the more responsible posts, and the whole of the subordinate staff, which is Indian, no less than 97 per cent. are natives of the country. Nearly two-fifths of the territory and just below a quarter of the population is not under direct British administration, but is ruled by native chiefs, over whom the Government exercises the authority of a paramount Power only. Speaking generally, the same protection against usurpation or encroachment, and the same obligation of loyalty and good government are extended to the lord of a dozen villages, who happened to be in lawful possession when his engagement with the British Government was concluded, as to the ruler of the twelve millions of the State of Haidrabad.

Occupations of the People.—The conditions that make this unprecedented system of government both possible and suitable to the country are to be found first in the divergent interests and aspirations of sectional rivals, religious and racial, which are repressed by strong and impartial administration, and then in the economic distribution of the population. Not merely is the overwhelming majority of the masses of India purely agricultural, but by the character of the tenure of land and of the social system prevailing over most of the country, it is also attached in a remarkable degree to its birthplace. The bulk of the population lives in villages, a term which includes both a collection of dwellings and the land tilled by the inhabitants, each forming an independent community, complete in itself, even to the administration of its own affairs, and providing subsistence for both its cultivators and artisans. Throughout nearly the whole country the land is held, either nominally or in practice, by peasant proprietors, in small holdings with security of tenure, so far as it is possible for the State to secure it. The system of caste restricts in most cases social and industrial ambition within very narrow limits, and this, together with the diversity of language and climate, tends to make migration to more favoured localities a matter of inconvenience and hardship, rather than of advantage. Every circumstance in the village life is discouraging to mobility, co-operation, or to common interests of a public character. Stationary pursuits accordingly are the rule, and the mass of the people is engaged in cultivation, cattle or sheep breeding, fishing, or the like rural occupations, and no more than 5 per cent. is attracted into aggregates large enough to be considered as towns. Home industries are largely practised, though the custom of the craftsman does not usually extend beyond the village to which he is affiliated, or its immediate neighbourhood. The tradition of the delicate work to which Indian art owes its reputation, still survives, but these

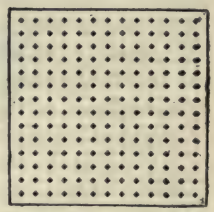

FIG. 249.—*Average population of a square mile of India.*

fine products never entered into the economic life of the masses, and throve only upon the fitful and precarious patronage of native courts. The congregation of the workmen into factories is a feature of the present generation, and has taken strong root in the cotton industry of the west coast and in that of jute in Calcutta and its neighbourhood. Cawnpore, too, in the upper Ganges valley, is a centre of both cotton and leather work. Among other modern industries which have attracted a fair number of the lower classes are the tea gardens of Assam, the Nilgiri hills and the sub-Himalayan region, the indigo works of Behar and Oudh, and the iron-smelting and coal mines of Bengal. Agriculture, however, remains the mainstay of the country, and the trading classes, spread all over India, rural and urban, are chiefly engaged in the collection and distribution of field produce, accompanied, in nearly every case, by money-lending, the traditional function of their class in the east.

Trade.—The development of the great seaports has afforded an opportunity to the upper class of traders of which they have been quick in availing themselves. Before the British were in power, the foreign export trade of India consisted chiefly of art fabrics or luxuries, valued at not more than a million sterling per annum. It has since expanded amongst the masses in place of the comparatively few, and the peasant profits, not the handicraftsman. Its annual value, excluding treasure, is now about 1,200 millions of rupees, or over 80 millions sterling. The items vary in proportion, but the average order is as follows: Grain, 180 million rupees (including rice, chiefly from Burma, 130 millions; and wheat, from northern India, about 40 millions); then, raw Cotton, from western India, 140 millions, and Oil Seeds about 170 millions; raw Jute, from Bengal, 110 millions; Tea, Opium, hides and skins, some 85 millions each. Indigo has fallen from 53 millions in 1895 to 18 millions in 1901, owing to the successful competition of artificial products. Lac and raw wool follow at an interval which varies considerably from year to year. The result of the new departure in manufacturing industry is seen in an increasing export of jute goods now valued at about 80 million rupees, and of cotton yarn, principally to China, valued at about 50 millions, with half that value in coarse fabrics, popular in East Africa. The import trade has relatively outstripped the export, although, owing mainly to the employment of British capital in industrial and commercial enterprise and the necessary liquidation in England of part of the cost of British officials and troops, the actual value of the imports is considerably below that of the exports. Taking the sixty years ending with 1896, in 1836, the imports of merchandise were 30 per cent. of the total and 39 per cent. at the end of the period, the rate of increase having been 930 per cent. in the exports, and no less than 1419 in the imports. The latter consist largely of cotton and woollen piece goods, metal and hardware, machinery, railway plant, and luxuries such as silk and sugar, with a rapidly increasing demand for mineral oil, European clothing, and a fairly constant market for British coal.

Communications.—In former days, owing to the want of protection and the heavy and frequent transit duties levied by each State on goods merely passing through it, but little use was made of the seaports by the inland countries. The improved roads are now freely used, and the great waterways of the Ganges, Brahmaputra and Irawadi, and, to a less extent, the lower Indus, are crowded at certain seasons with small craft plying between the coast and the interior. Trunk roads connect all the principal towns, and in the Gangetic valley, Orissa, and further south on the east coast, canals have been opened to aid local traffic. Thus, for short distances of two or even three hundred miles, the traditional modes of transport, by boat, cart, or pack animal, still hold their own. The most important change in trade, however, has been wrought by the development of railways, introduced in 1854. At first trunk lines were constructed, partly to connect the four or five chief cities, partly, also, for strategic purposes. Branch and chord lines followed, first for trade purposes, and then, again, to bring grain within reach of the tracts liable to failure of harvest when the rainfall was unpropitious. The general scheme has now been nearly completed, except in Burma, Assam and Sindh, where links of considerable length are still under construction. The mileage open for traffic in March, 1901, was 25,035. The number of men employed in 1897 was 283,000, of whom 4,660 were British. It was once held that for light traffic in thinly peopled districts, or where the exports of produce are not likely to be heavy, or concentrated into a few months of the year, a narrow gauge, lighter and cheaper than the standard, would be sufficient; certain spheres or tracts were accordingly assigned to be served by the narrow gauge, whilst the main arteries of foreign commerce, ending at the principal seaports, are on the broader gauge. The development of through traffic, however, has led to the linking up of several of the narrow-gauge systems, and in spite of the inconvenience and expense of transferring goods, at the junctions with the other lines, the use made of the lighter system is growing with the rest.

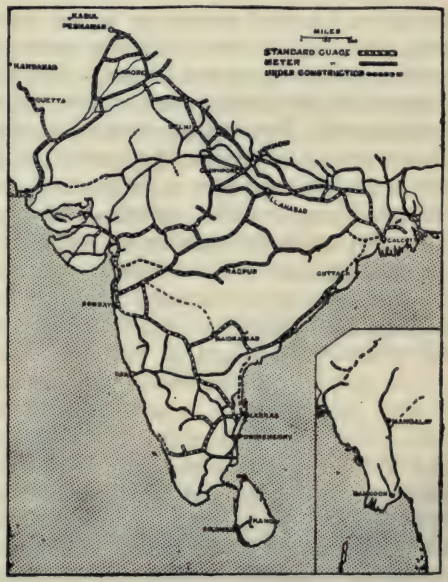

FIG. 250.—*The Railways of India and Ceylon.*

Finally, whilst the course of the Ganges and Indus is closely followed by various lines of rail, the same rivalry does not yet exist in the case of the Brahmaputra and Irawadi, on each of which, accordingly, passenger and goods steam-vessels ply throughout the year for many hundred miles. Similarly, the rugged coast between Bombay and Goa precludes access otherwise than by coasting steamer. Orissa, till recently in the same inconvenient position, has now a railway approaching completion which crosses the swamps which formerly interrupted its land communication with Calcutta.

Political Divisions.—To understand the political subdivisions of India, one must remember that the Empire has been built up by successive accretions, and that in all territorial demarcation the independent existence of numerous protected States scattered over the country had to be regarded. The boundaries, therefore, are not necessarily in accordance with physical or linguistic distinctions, nor are they always such as would be the most convenient in the present day. Of late years, however, changes have been made for administrative purposes, bringing the various charges more into harmony with modern conditions. The special features of urban development in the Indian Empire must also be taken into account. The natural resources of the country not being such as to attract people into large aggregates for industrial purposes, and, until within the last century or so, no tendency having existed towards foreign trade, the towns of India had almost all a political origin and development. The chief gathered together his forces in the situation most convenient for defence, and walled them in with the same object, including all the civil population necessary for their subsistence and comfort. The position was, therefore, usually on a hill or river. Occasionally, at the arbitrary command of the chief, the site was changed, and the whole nucleus of the town transported to a distance. Under the Moghal rule, the main conditions were the same, though the establishment was somewhat more enduring. The life of the place waxed and waned with the fortunes of the chief, and we thus find in different parts of the country vast areas covered with ruins, and large cities in a state of decay, due to the supersession or fall of their patron. But where the chief is still in power, the old conditions are maintained, improved by participation in the modern advantages introduced under British auspices. Irrespective of these last, the most progressive cities of India are, first, the seaports established under British rule, then the smaller towns which have profited by their position as railway centres, and, again, those which have been selected for military stations. The present tendency seems to be for a town to decay in proportion to its detachment from the modern or commercial element in its life, and to rise where it shows a spirit of adaptation.

Bengal, with a population of 74,745,000 under British administration, and 3,700,000 under petty chiefs, contains four well-defined regions. (1) *Bengal* proper consisting of the Delta and the low-lying land east and north of it, separated by hill ranges from Burma and Assam. (2) the

densely peopled plain of *Bihar* to the north-west, between the sub-Himalayan forests of Nipal and the Central Belt of hills which divide it from the valley of the Mahanadi. (3) The northern section of that belt, known as *Chutia Nagpur*, a region of forest and tableland, held chiefly by descendants of the dark races. (4) *Orissa*, a country of low coast backed by forest-clad hills. Politically the old presidency was divided in 1905 into *Bengal* and *Eastern Bengal and Assam*.

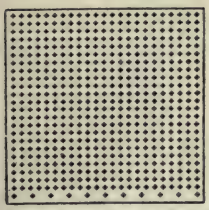

FIG. 251.—*Average population of a square mile of Lower Bengal.*

Nearly the whole of Bengal may be said to be very fertile; and, though parts of Bihar lie within the zone of uncertain rainfall, the density of population throughout the province averages nearly 500 per square mile. Except in the dryer tract of northern Bihar, rice is by far the predominant crop. The poppy is grown for the preparation of opium in the same tracts as wheat and indigo, and jute is a favourite staple in the north and east. The economic position of the province of Bengal differs from that of most of the rest of India in the existence of a large class of landlords, the creation of the early British administration, intervening between the cultivator and the State, who hold their estates at a quit-rent fixed at the end of the eighteenth century, when the land lacked both labour and security of possession. The linguistic distinctions of Bengali, Uriya, and Hindi, together with the large Musalman element in Bihar and eastern Bengal, and the centralisation of business and professional employment in Calcutta, render the province peculiarly void of cohesion.

Towns of Bengal.—*Calcutta*, the creation of an early generation of British "adventurers," is situated some thirty miles up the Hugli mouth of the Gangetic system. With its suburbs, it contains a population approaching a million. The city is emphatically mercantile, but of late years jute and paper manufactures have been established in the neighbourhood, whilst the residence of the Governor-General and the large body of officials surrounding him materially adds to the population during a part of the year. The other great cities of Bengal originated in the Musalman occupation, when the Deputy Governors of the Moghal became practically independent chiefs. *Patna* rose on the site of the former capital of

FIG. 252.—*The Site of Calcutta.*

an ancient Buddhist monarchy, and as the centre of a large and wealthy agricultural tract it still enjoys a certain local reputation. In this it resembles its compeer in eastern Bengal, *Dacca*, the centre of a Musalman population almost entirely recruited by conversion from the dark and semi-Brahmanised tribes of the Delta. Its repute for the weaving of fine muslins has died out, but it is a centre of collection and distribution for Calcutta and the nearer port of *Chittagong*, and thus just holds its own against decay. The next large town is *Gaya*, in South Bihar, a centre of religion for the Brahmans in the present day, as it was for the Buddhists in times of yore. Its population is rising with the improved railway communication with the trunk lines. *Murshidabad*, the later Musalman capital of the province, has waned to a small local centre, and its compeers, *Bhagalpur* and *Monghyr*, are practically stationary. *Cuttack*, capital of the Orissa division, maintains the rate of growth prevailing in the rural neighbourhood, but with the completion of the new trunk line of rail from the east coast is likely to take a higher commercial position.

The United Provinces of Agra and Oudh include the upper valley of the Ganges and a small portion of the hill region of the Central Belt, to the south, and of the Himalaya, on the north. The population of 48½ millions, including 800,000 under petty chiefs, is mostly settled on the fertile plains, with a density of 536 per square mile in Oudh, and an average of 432 for the whole province. While the physical conformation and ethnographic distribution are less varied than those of Bengal, there is far more diversity in the produce of the soil. Rice gives place to millets in the south and centre, and to wheat in the north and west, varied with pulse and cotton. Towards the east the poppy is cultivated to a considerable extent, as in Bihar, for the preparation of opium; indigo, too, reappears, and rice regains a part of its importance. The western and southern tracts of the province, however, are within the zone of uncertain rainfall, and during the last thirty years have suffered from famine severely on four occasions.

Towns of the North-West Provinces.—The number of small towns is above the average of India, owing mainly to the number of petty chiefs formerly, and in later years to the assignment of large estates for colonisation by private enterprise. There are no less than six large cities. Three of these owe their situation to convenience of access to the sacred river, Mother Ganges, where it combines navigability with religious merit. *Benares* heads the list, and maintains its rank as the chief religious centre of the Brahmans. *Cawnpore*, though in the midst of Hindu traditions, stands now in the van of the manufacturing enterprise of upper India. The Musalman name of *Allahabad* has been adopted for the *Prayag*, or Confluence, of the Hindus. The town is placed at the junction of the Ganges and her sacred sister, the Jamna, and in modern times has been popularised as

a pilgrimage centre by the junction of the trunk railway lines from northern, eastern and western India. In the same way, *Agra*, one of the Moghal capitals, has been saved from decay by its recent connection with the western railway system on the one hand, and that of the central Gangetic valley on the other. A second town originating with the temporary dominion of a local Musalman chief, is *Bareli*, in the sub-Himalaya plain, and now, like *Meerut*, both a railway and a manufacturing centre of rising importance, not unaided by the addition of large British military settlements in the suburbs. *Mirzapur*, on the other hand, which once enjoyed, from its position on the Ganges, a large through trade in cotton and a considerable local weaving industry, is decreasing in population. In Oudh the caprice of a local chief is well shown in the establishment of *Lucknow*, a city with, even in its decadence, over a quarter of a million inhabitants, in supersession of its neighbour, *Faizabad*, itself an adjunct of the Brahmanic centre of *Ajudhia*, on the Ghogra, which does not now contain 100,000 people. The industrial arts fostered by an Oriental court still flourish in Lucknow, owing to the custom of the surrounding landlords, and, to some extent, of the British station, which, since the Mutiny, has been a large one. In the north of the province, *Moradabad* and *Shahjehanpur* have developed a considerable industry in sugar.

The Panjab, in its modern extension, comprises not merely the valley of the Indus and its great tributaries, but a portion of the Jamna system. The new **Frontier Province** lies to the west of the Indus, and contains an area of 16,500 square miles, and a population of about 2¼ millions, chiefly Musalmans, of Pathan or Afghan descent. The State of Kashmir, too, has been confirmed in its suzerainty over the frontier chieftainships of the Hindu Kush range and the upper Indus valley. Thus the 20 millions directly administered by the British Government is increased by the population of the States under Sikh, Musalman and small Hindu chiefs to nearly 25 millions. The density of population is greatest in the plain of the five rivers. The Himalayan valleys and the vast plains of the sparsely watered south-west show but a low density, and Kashmir is thickly peopled only in the valley of that name. The remarkable mixture of races to which history testifies, has been to all practical purposes eliminated over almost the whole province by the more dominant distinction of religion. The orthodox Brahmanic creed flourishes along the Jamna and in the sub-Himalaya. In the centre of the plains the Sikh community is pre-eminent, whilst the tendency of Islam to prevail grows stronger towards the west. The northern origin of the mass of the peasantry is apparent in their superior physique to the men of other provinces, like whom they are mainly cultivators, with a special system of village organisation. Towards the south-west the absence of irrigation and the expanse of open land covered with coarse grass have given importance to pasture and cattle-breeding; but elsewhere the autumn crop supplies the millets and fodder for the year, whilst the spring harvest

is chiefly composed of pulse and, above all, of wheat and barley, of which the frontier province is one of the principal exporters.

Towns of the Panjab and Frontier.—Setting on one side the numerous middle-class towns due to the wheat trade and to the extension of railways which has raised it to importance, the larger centres of the Panjab are of peculiarly modern and definite origin. *Delhi*, no doubt, stands on the ruins of ten cities, one over the other, and for miles round the country tells the tale of past grandeur and decay; but the existing city, the only one associated in India with the imperial idea, owes its position and fame to the Moghal dynasties. At the time of the highest prosperity of that line, the city was known as the *camp* of the Emperor, and, when he moved northwards during the hot season, three-fourths of the population migrated with him. Delhi has now begun an industrial career on European lines, which, with a large wheat and produce market, and direct communication with all parts of upper India by rail, ensures its prosperity. *Multan* stands exactly where a city always has stood since history began, near the junction of the five rivers with the Indus, on the edge of the desert, and touching the border land between upper India and Sindh. *Peshawar*, at the mouth of the Khaibar Pass, has in like manner been selected by uncounted generations as an outpost against invasion. The existing town, however, now the capital of the Frontier Province, is to a great extent the creation of the great Sikh chief, Ranjit Singh, and, under British control, contains a population nearly as much Central Asiatic as Indian in its appearance and composition. *Lahore* is still what Ranjit Singh made it, the political capital of the Panjab, and it is also a considerable railway centre. *Amritsar* remains the head-quarters of the Sikh religion, and is a place of industrial note, especially in textile trades. Its situation, in the middle of a fertile plain, as well as its sacred reputation, probably induced the Sikh leaders, when they had established a military authority, to substitute, as their centre, a more defensible position on the banks of the Ravi. The modern military station of *Ambala*, however, and the fortified position of *Rawalpindi*, stand on the dry plain. The Sikh States lie mostly in the east and centre of the province, and the Musalman chief of Bhawalpur rules along the frontier between the Panjab, Rajputana and Sindh.

Sindh was placed, on its acquisition in 1844, under the Government of Bombay, from which, however, it is separated geographically by a band of desert, and communication, accordingly, has to be maintained by sea. It is bordered on the west by a line of barren mountains, and on the east by sand-hills and desert. The small area of arable land in the latter tract is the only part of the province where cultivation is dependent upon the rainfall, which, though scanty, suffices for the light crop of millet and pulse entrusted to it. The delta receives a heavier fall and absorbs a considerable amount of moisture from the sea-vapour, but the rest of the Indus valley and its neighbourhood is cultivated

either after the annual inundation or by means of artificial irrigation from the great river. Rice and millets are the main crops, but wheat is now grown to an increasing extent on the borders of the Panjab. In this part of Sindh the climate is almost rainless. It is also the hottest and one of the coldest in the country.

Towns of Sindh.—The opening of *Karachi* harbour has attracted the greater part of the produce trade of north-western India with foreign countries, the result being to raise the population more than 58 per cent. in the 20 years ending with 1901. *Tatta*, the old capital of the Indus delta, has fallen into decay. *Haidrabad*, at the apex, has considerable trade and local industries are active, especially since road and rail communication has been extended. In upper Sindh, the old commercial capital, *Shikarpur*, enjoys a reputation far beyond what its size would imply, since it contains a relatively large population of merchants who for generations have done business as far as the Caspian, Samarcand, and even Moscow. It is one of the comparatively few instances in India of a town being established and flourishing upon almost entirely commercial considerations. It stands in the open plain, bordering on the desert which has to be crossed before reaching the highways leading to Kabul and Herat respectively, through Afghan territory, and thus constitutes the trade complement of Kandahar. The situation of *Sakkar*, on the Indus at a point where the rocky banks admit of its being bridged, has raised the town to a new position; its business, both by rail and river, is considerable, and its strategic importance in excess of its size. The population of Sindh, over 3,200,000, is otherwise but thinly scattered over the rural tracts, with an average of no more than 68 to the square mile.

Bombay.—The Province of Bombay is irregular in shape and distribution, and a large number of comparatively small protected States are scattered throughout British districts, especially in the north and south. In the north is the fertile low-lying tract of Gujarat, rising to the hill lands of the central plateaux. Stretching eastwards from this lies the productive Tapti valley, as far as the confines of Berar and the Central Provinces. The Konkan forms a long narrow strip, mostly of shallow soil, along the coast, as far as the nearest approach of the Ghats to the sea, in Kanara. Above this lies the great tableland of the Dekkan, of which the portion within this province is about 200 miles in breadth, with a soil fertile in the lower, or depressed situations, light and shallow in the higher, and the greater part exposed to an unusual extent to the chance of failure of rain. As the rivers derive their supply entirely from the south-western air-current, the same cause which renders irrigation necessary in a bad season also shortens the supply of water in the reservoirs formed at the heads of the Ghat valleys to feed the channels. Hence the comparatively frequent occurrence of agricultural distress. The linguistic divisions of the province, though strongly marked, do not coincide with the geographical, except as regards Gujarat. Marathi, which prevails exclu-

sively over the Tapti valley and the Konkan, and also, of course, in its home, the northern Dekkan, fades imperceptibly into Kanarese towards the south and south-east. The population, especially in Gujarat, is remarkable for its relatively high proportion of the trading element, and merchants of this tract are found plying their trade all over the west and south of India, and even venturing to Zanzibar, Mauritius and Madagascar. The mean density in which the population of 15 millions is distributed, is just over 201 per square mile. The people subsist on the cultivation not only of millets, rice, wheat, pulses, and other food crops, as in most Indian provinces, but also of cotton, of which the west coast and Tapti valley have almost a monopoly for the foreign market. The commercial character of the upper classes is reflected in the unusually high proportion of the urban population, which reaches 20 per cent., or more than double that of India as a whole.

FIG. 253.—*Site of Bombay.*

Towns of Bombay.—*Bombay*, the business capital of the province, is entirely a British creation. Its acquisition in the dowry of Catherine of Braganza was at first hardly appreciated by its new owners, Pepys noting in his Diary that "The Portugals, it appears, have *choused* us in the island of Bombaim." It has a population of 776,000, the plague having killed or scared away over 40,000 since 1891. Its trade goes mostly by the Suez Canal to the West, or by Singapore to the East, with a rising share in the commerce of southern Arabia and east Africa. In Gujarat is the old Musalman capital, *Ahmedabad*, now a military station, a railway centre and a manufacturing town, with much through trade in cotton and wheat. *Surat*, the first trading centre of the British in India, has ceased to be a seaport, owing to the silting up of the mouth of the Tapti. *Poona*, the capital of the Maratha power under the Peshwa, and still the headquarters during the rainy season of the Provincial Government, retains much of its former character in the absence of modern trade-bustle and the predominance of the Brahman element. *Sholapur*, on the other hand, in the north-east of the Dekkan, and *Hubli* in the south-west, have thrown themselves into the stream of modern progress, and set up large cotton factories and railway

works respectively. The same tendency is visible in several of the smaller towns, some of which are highly progressive.

Berar.—The small province of Berar lies between the Satpura and the Dekkan, and, with the exception of a hilly tract to the south and a smaller one to the north, consists of a level and very fertile plain. The inhabitants, reduced by famine from nearly 3 millions to 2,754,000, are almost all Maratha by race, with a sprinkling in the north of the dark hill tribes. The agriculture is noteworthy, because, of all the provinces, Berar alone produces relatively more for export than for home consumption. It has a fair staple of cotton, and excellent oil seeds and wheat. This advantage has conduced to the conversion of local markets into the resort of foreign traders, Indian and European, and thus, although the chief towns, *Ellichpur* and *Amraoti*, are small, they are busy at the harvest season out of proportion to their permanent population.

Central Provinces.—The irregular tract known as the Central Provinces comprises, first, the nucleus of the hills and plains round Nagpur; then, the Narbada valley with the broken country to the north, forming part of the Central Belt of hills, and, thirdly, the plain of Chattisgarh to the Mahanadi, with the wild forest tract separating it from Orissa on the east, and the Telugu country of Madras and Haidrabad on the south. In the Nagpur division and high up the Narbada valley, the Maratha element predominates, whilst throughout the hill tracts, and over a great part of the eastern plains, the dark tribes, either in their primitive purity of race or largely mixed with settlers from the Gangetic plain, are in possession. The valleys and the Chattisgarh plain are fertile. The north and west produces most wheat, millets, and pulses; the east more rice, blending towards the west with the dryer crops. The hills and forest tracts produce little but light crops of the smaller millets. The population of 10 millions in the area under British administration shows a density of 114 per square mile, against 125 before the last famine, and the corresponding figure for the 2 millions in the petty native States is only 67 against 73.

Towns of the Central Provinces.—*Nagpur*, the centre of the Maratha power of the Bhonslé family, has the beginnings of a considerable trade in produce and of the cotton industry. *Jabalpur*, commanding the upper Narbada valley, and on the trunk line between the coast and upper India, is a local centre of the wheat trade. *Saugor*, a military station in the heart of the central hill belt adjoining the Gangetic valley, has merely local importance. The old Musalman capital, *Burhanpur*, on the Tapti, stands still, and much of its industrial and commercial repute has passed to modern places. On the other hand, *Raipur*, the chief town of the fertile Chattisgarh plain, has reaped the benefit of its recent connection with the railway system joining Nagpur with Bengal, not in permanent residents so much as in traffic in wheat and rice, attracting a well-to-do floating population during the season. In other parts of the province the pacification of the country generally has tended to the expansion of the native tendency to trade at

movable weekly markets supplied from the larger centres, rather than to the establishment of new towns.

Madras.—The Province of Madras comes next to the Gangetic provinces in population, containing 38 millions of people, with a mean density of 269 per square mile. In addition, there are States politically connected with it, with a population of over 4 millions and the high density of 420. The distribution, however, is very uneven. The fertile strips along the north-east and the south-west coasts differ in physical character from the rest. The hilly country which hems in the former is of the same description as that to the south-east of the adjacent Central Provinces. The Malabar coast is separated from the tableland by more rugged country, especially where the Ghats widen out into the Nilgiri on one side and the Anamalai range on the other. The more or less flat region along the east coast is far wider, and the edge of the tableland in that direction is but faintly defined until it approaches the Nilgiri in the south. Thus, the physical divisions of the province correspond fairly closely with the climatic. First, the tract dependent upon the north-east air-current, from Orissa to Cape Comorin; then, the sphere of the full force of the south-west air-current, and finally the tableland between the two, subject, like the rest of the Dekkan, to light rain and occasional drought. The dense population along the coast is supported mainly by rice, which the unfailing rainfall on the west and the great irrigation works from the three chief rivers on the east, render amply sufficient. The former of these tracts is rich in spices, coco-nut, and, since British occupation, in coffee and tea. Millets and oil seeds, with a little cotton, are the staple crops of the uplands. These differences, with those of language, and the wide development of the caste spirit, keep the people apart to an unusual extent.

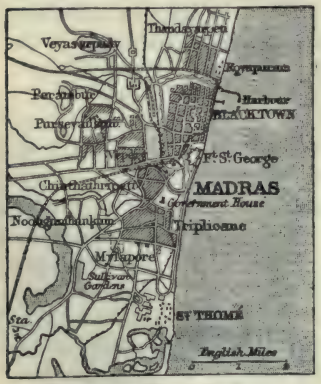

FIG. 254.—*Site of Madras.*

Towns of Madras.—Large towns, with the exception of the seaports, are little more than local trading centres, or, like Tanjore, the former residence of a chief and his court. *Madras*, with a population of over half a million, is, like Calcutta and Bombay, the result of British occupation, and was, in fact, the first permanent territorial possession of the Company. It has, however, few manufactures, and, owing to its open roadstead, far less trade than its fellows, and the development of the smaller ports such as Negapatam, Coconada, Calicut, Mangalore and Tuticorin, diverts much of the exports which would otherwise have been obliged to seek an outlet through the capital Madras, accord-

ingly, is relatively more of a literary and professional centre than either Calcutta or Bombay. The same feature is to be found in *Madura* and *Combaconam*; *Trichinopoly* has considerable local business to keep it up. *Tanjore*, with about the same population as its neighbour Combaconam, is both the centre of the most densely peopled tract in southern India, along the lower Kavari, and has the tradition of a native Court, which only ceased to exist in the middle of the nineteenth century, so that the classes attracted by its favour have not yet died out. *Bellary*, like Trichinopoly, is the centre of a large agricultural tract, though by no means to be compared with the south in fertility and population. It has, however, railway communication with east and west, and a large military suburb. *Calicut*, the principal port of Malabar, is a town of ancient fame as the capital of the Zamorin, and has revived of late years its long-standing trade with the West. On the east coast, *Negapatam*, has opened considerable trade with Ceylon, Burma, and Singapore. The same enterprise is found in the smaller ports to the northwards on that coast, *Coconada* and *Masulipatam*. *Salem* is an important local centre, and used to have a good reputation for its steel and iron, now declining, partly owing to foreign competition, partly to the want of cheap fuel for the wasteful method of smelting in practice.

Assam.—The frontier province of Assam, in its correct limitation to the Brahmaputra valley and the adjacent hills and mountains, is not considered by its people to form part of India, and some discontent was caused in 1905 when it was united with parts of Bengal to form the new province of *Eastern Bengal and Assam*. Before this political regrouping the administration of Assam, including the outlying hills and the State of Manipur, contained a population of over 6 millions, about half of which belonged to the southern portion. The mean density of population in the province is 112 per square mile, but this is a figure of no practical value, since in the Surma valley the density is 319, in the Assam valley 117, and in the hill country only 25. There are no towns of more than 14,000 inhabitants. *Sylhet*, the chief market of the Surma valley, reaches that number, and *Gauhati*, a central landing-stage on the Brahmaputra, has rather less. The political headquarter station is *Shillong*, high up in the Khasia hills. In 1897 it was almost levelled to the ground by an earthquake. About two-thirds of the crops raised consist of rice. A small area is under jute and oil seeds, and in the hills small patches are cleared for coarse grains. The great feature in the agriculture of the province is the recent development of the tea-planting industry, originally entirely conducted by British capital under British superintendence, but now shared by natives of the country. The average annual tea export of India between 1897 and 1902 exceeded 170,000,000 lbs., to which Assam is the largest contributory.

Burma.—The province of Burma is still divided for administrative purposes into Upper and Lower, and these titles very fairly connote the

climatic difference between the two. The further subdivision geographically suggested is that into plains and hill tracts. Lower Burma, whether the *Arakan* strip, partly colonised from Bengal, the *Tenasserim* strip, bordering upon Malay characteristics, or the intervening delta of *Pegu*, is emphatically a damp or rice-producing region. The riverain tracts of Upper Burma, on the other hand, lie high and dry, unswept by any strong vapour-laden winds, liable, accordingly, to drought, and producing millet, oil seeds, cotton, and a little wheat, with rice wherever, as near hills, there is sufficient moisture. The population, again, is well demarcated, not according to the two great territorial divisions, but into those of the Irawadi valley, whether in the Lower or the Upper division, and the darker and uncivilised tribes of the hills. Throughout the rice tracts communication is difficult and trade confined to local centres on rivers or creeks. The railway now intersects Burma from north to south, with branches to the principal outlying markets. Next to rice, of which the exports amount to not far below half the estimated produce, the chief material sent abroad is teak timber and cutch, or catechu.

Towns of Burma.—The population of 10½ millions, scattered over about 237,000 square miles, shows a very low density, and, with the exception of Mandalay, the capital of the late King of Upper Burma, and the comparatively new seaports, the towns are chiefly little more than local markets. *Mandalay*, well situated on the Irawadi, attracted most of the trade from the north and east. The great outlet, however, of the produce of the province, is *Rangoon*, in the delta, rapidly increasing in population. The former local capital, grouped round a celebrated Buddhist temple, has become a busy seaport, with a considerable number of commercial establishments attracted from India and even China, in addition to the strong British element now settled there. *Maulmain*, the next port in importance, has about one-tenth the trade of Rangoon, and exports chiefly timber and other forest produce. The centre of the trade of the Arakan coast is at *Akyab*, but it has little beyond local influence. In the north of Upper Burma the town of *Bhamô*, on the Irawadi, though very small as yet, is likely to increase considerably, both as the only town on the Chinese frontier, and, also, owing to its connection with Mandalay and the rest of Burma by rail as well as steamer.

Protected States of Rajputana, &c.—States not directly administered by the British but remaining under their own chiefs are scattered all over India. The greater number are congregated in the tract known as Rajputana, with its extension to the peninsula of Kathiawar on the west and to the plateau of Central India in the south-east. This vast region is parcelled out into States varying in area from the 37,000 square miles of Marwar to the four or five miles under a petty chief on the coast or embedded among more powerful neighbours in Central India. The subjects of Sindhia in Gwalior number two millions, of Jaipur, over 2½ millions, and several other chiefs rule more than a million. Whilst the south and east of Rajputana are fertile,

the west is principally desert, with from 7 to 60 people to the square mile. Central India comprises the Malwa plateau, the Chambal valley, and the hill country of Rewah and Bundelkhand, all more or less favoured by nature, and far more densely peopled now than eighty years ago, when they were the cockpit of Indian rivalries. Acting upon the principle of confirming the possession of the actual chief at the time of the assumption of suzerainty, the British Government sterotyped the conditions of the first quarter of the nineteenth century, so we find in power not only the ancient lines of Rajputs, at *Udepur*, *Jodhpur*, *Rewah* and *Jaipur*, with their offshoots in *Kathiawar*, but the Maratha military dynasties of Sindhia and Holkar, and the Pindari freebooters who had carved out little States for their families in those troublous times. These tracts have been included in the general system of Indian railways, and several of the chiefs have constructed feeder lines in their own territories, to the great advantage of the outlying parts of the country. Unfortunately, the eastern portion of both Rajputana and Central India falls within the zone of liability to famine, and within the last half-century has been severely visited by that calamity on three or four occasions. The rest of the country, however, where not actually in the desert, is fertile and well watered, either naturally or by wells or channels. In every State the chief's headquarters constitute the principal town, and in addition to *Jaipur* with 160,000 and *Gwalior* with 89,000 inhabitants, there are five towns of more than 50,000, each much resembling the other in general features. Much of the territory of the Gaikwar of Baroda, with a population of just under 2 millions, is scattered in detached morsels in the midst of British districts and Kathiawar chieftainships. Like the rest of Gujarat, the soil is remarkably fertile, and supports the heavy density of nearly three hundred people to the square mile. The central and most valuable portion of the State lies round *Baroda*, the capital. The city has considerable trade and a large professional element. There is no other town of importance in the State.

Haidrabad.—The principal State in the Dekkan is that of Haidrabad, founded by a Moghal viceroy, who asserted his independence on the wane of the empire of his sovereign. It is very compact, contains over 82,000 square miles, and a population of over 11 millions. As it lies entirely on the Dekkan plateau, its subdivisions are mainly linguistic. Marathi prevails in the north and west; Kanarese in the south-west, and Telugu, to the east. All but a portion of the north and east lies within the famine zone. The soil is of much the same character as that of the Bombay Dekkan, but improves slightly towards the north-east. Recently there has been a successful attempt made to utilise the large coal deposits in the eastern portion of the State, and the supply from *Singareni* is now in demand on railways for a considerable radius from the mines. As in the other States, the capital town, *Haidrabad*, absorbs most of the urban population of the Nizam's territory. Its situation seems to have been selected of yore with a view to defence, before the

days of long range artillery, as it lies in a plain, watered by a small river, but with low hill forts at a short distance. The next town in size is an older Musalman foundation, *Aurangabad*, with a small population, also designed for strategic purposes in the early days of Dekkan expeditions.

Mysore completes the list of Dekkan States. It lies, like Haidrabad, entirely on the tableland, bordering on the Ghats to the west, the Nilgiri on the south, and the edge of the plateau on the south-east. The area is about 28,000 square miles, and the population nearly five millions. The soil is more fertile on the whole than in the northern Dekkan, but most of the State lies under liability to drought. For fifty years, ending in 1880, the State was under British rule, and the system then in force was continued after the rendition to a scion of the former reigning family. It is thus a fair example of foreign initiative under Indian administration. The general agricultural character of the State has been to a small extent relieved by the opening of gold mines in the south-eastern tract. The enterprise has not proved remunerative, from a financial standpoint, except to a few of the companies engaged, though the metal is certainly found in fair quantities. The long period of British administration, together with the still longer term of Musalman usurpation which preceded it, have obviated the usual concentration of the urban population round the palace of the chief. Thus *Seringapatam*, the Musalman capital, is now a small town, the descendants of Tippoo Sultan having been deported beyond the frontier of their late father's dominion. *Bangalore*, the chief seat of the British in Mysore, is much larger. *Mysore*, the chief's capital, doubtless suffers at present from the superior commercial advantages of its modern neighbour. Both, however, are now connected with the trunk lines of Madras and the northern Dekkan, a precaution taken after the great famine of 1877. The forests of Mysore, which lie along the Ghats and round the Nilgiri are, with Burma and the Assam lower ranges, the only haunt of the wild elephant left in India. They also furnish the greater part of the sandal wood used for carving and for the sacrificial ceremonies of the Brahmans, and in parts have been cleared for the growth of coffee by British planters.

Travancore and Cochin.—South of Mysore, isolated amidst the mountains and lagoons of the extreme south-west of the peninsula, are the two little States of Travancore and Cochin, politically connected with the Government of Madras. Physically, these States resemble the neighbouring Malabar tract, and the people are of much the same races and habits as to industry and occupations. The barrier set by caste between classes, however, is maintained inviolate, and society is altogether on a basis which, though prescribed by Brahmanic theory, the more accessible part of India has long abandoned.

Kashmir.—In Kashmir, on the other hand, a State almost equally isolated from India by the Himalayan ranges, the masses have long been converted to Islam, under the influence of the Moghal emperors who made the valley their summer quarters. The State itself, however, has

been extended far beyond the valley, and includes a portion of the Upper Indus as well as the sub-Himalayan State of Jammu, from which the chief originally came. The inhabitants of the bleak plateau of Ladakh and of the gorges of Baltistan, are of the Tibetan type and language, and Buddhistic in faith. The people of the southern hills, again, differ in race and language from those of the valley. The civilisation of Kashmir is practically centred in *Srinagar*, the capital, and *Jammu*, where the court spends the winter. The weaving and silver-working industries still survive in the capital, but the rest of the country is as purely agricultural as the plains of India. The outlying States of Hunza, Nagar and Chitral, which own the suzerainty of Kashmir, have only been brought within the sphere of British-Indian influence of late years. Their country is barren, except along the streams running through the deep valleys, which provide food for the sparse population.

Baluchistan.—The territory known as Baluchistan lies altogether beyond the geographical frontier of India, though included in its political area, the whole being a Protectorate under the British Government. It is bounded on the east by Sindh and the south-western Panjab; on the west comes Persia; on the north, Afghanistan, whilst the south touches the Indian Ocean. The coast, however, possesses no harbour, though there are two fairly convenient roadsteads at Gwadar and Sonmiani. This portion of Baluchistan boasts of the bad pre-eminence of being the hottest place in Asia, but its title is disputed by Aden and upper Sindh. A considerable part of the country is entirely desert, and none but a comparatively small tract along the Sindh border and a few valleys in the north-east is sufficiently well watered to produce more than a scanty crop of grain or a little fruit. The area is about 132,000 square miles, with a population of about 812,000. The prevailing races are the Brahui and the Baluch. The former predominate in the east, the latter towards the mountains and the Panjab. They are divided into eight States, one large and seven small; the former, Khalat, exercising a sort of suzerainty over the rest. There is no town of any importance. *Khalat*, the largest, contains only about 15,000 inhabitants. In the north of Baluchistan lies the portion ceded to the British on lease, with the addition of the valleys annexed from Afghanistan at the conclusion of the war in 1880, and those to the east, through the Sulaiman range, occupied in 1887 and 1889. The population of this tract is about 308,000. The chief town is the military station of *Quetta*, with a population of about twenty-four thousand, including troops. The Sindh-Pishin railway and a line through the Bolan Pass connect Quetta and British Baluchistan with the Indus valley.

The Andaman Islands.—The group of the Andaman Islands lies about 600 miles south of the mouth of the Hugli river, and some 160 miles from the coast of Burma. The main portion consists of three narrow islands, mountainous and thickly clad with bamboo and valuable

timber. The highest peak reaches 2,400 feet above sea level. The rainfall is heavy, as the islands lie in the direct course of the monsoon currents. The inhabitants, about 1,900 in number, appear to be of Negrito or Malay descent. They are very timid of strangers, and though attempts have been made to civilise those on the larger islands, only a few have settled down. Since 1789 the only use made of the Andamans by the Indian Government has been as a convict settlement. The present station at *Port Blair*, one of the finest harbours in the East, was established in 1858, and contained, in 1901, 16,000 convicts, warders, and officers. The islands constitute a Chief Commissionership under the Government of India. The heavy and malarious climate in the interior of the islands has prevented European exploration, but of late the natural resources of the country immediately round the settlement have been utilised and new products introduced.

The Nikobar Islands.—This group is less than a third of the size of the Andamans, and forms a similar line stretching southward towards Sumatra, separated from the Andamans by the Ten Degree Channel in 10° N. They were occupied by the British in 1869, after a formal cession by the Dutch. The inhabitants, numbering about 6,300, are of two distinct races, one of a Malay type, superior to the Andamanese, the other a Mongoloid, of lower civilisation, driven from the coast to the interior. The coco-nut palm, which is not found wild in the Andamans, flourishes and affords a plentiful supply of copra and fibre, to procure which some fifty or sixty vessels regularly visit the group. Unlike the Andamans, the Nikobar group contains no good harbour, and but a fair anchorage, at *Nancowrie*. Owing to the rough sea and strong currents, there has never, apparently, been any intercourse between the two groups, an isolation which, perhaps, considering the nature of the tribes, has conduced to their survival.

The Lakadiv and Maldiv.—The island group of the Lakadiv consists of very numerous coral atolls, about 200 miles from the coast of Malabar. The Maldiv Islands form a long chain also of coral formation, stretching to the south. *Div*, or *Dvipa*, means island in the languages derived from Sanskrit, and *Laka* probably means a hundred thousand, and *Mala*, a Dravidian equivalent of one thousand. The inhabitants of both are Muslim, probably of Arab origin, with a little of the fishing blood of the opposite mainland added, in the Lakadiv. They live sparsely upon fish and, in the Maldiv, on the produce of their coco-nut palms, which they sell in the Malabar or Ceylon markets. For administrative purposes, the Lakadiv, with a population of just over 10,000, form part of the two districts under the Madras Government which lie nearest them, and the Maldiv are under the colonial government of Ceylon. The two groups speak different languages, that to the south being allied to the Singalese, that of the Lakadiv to Malayalam, an offshoot of Tamil.

STATISTICS.

Province or State.	Area in square miles.	Population. 1891.	Population. 1901.	Density per square mile.	Percentage of urban population. 1901.
(a) Provinces—					
Madras	141,726	35,630,440	38,209,436	270	11·19
Bombay	75,918	15,959,135	15,304,677	202	20·22
Sindh	47,066	2,875,100	3,210,910	68	12·37
Bengal	151,185	71,346,961	74,744,866	494	5·18
United Provinces { *Agra* / *Oudh*	83,198 / 23,966	34,253,960 / 12,650,831	34,858,705 / 12,833,077	419 / 535	12·43 / 7·32
Panjab	97,209	19,009,343	20,330,339	209	11·44
N.W Frontier Provinces	16,466	1,857,504	2,125,480	129	12·70
Central Provinces	86,459	10,784,294	9,876,646	114	8·31
Berar	17,710	2,897,491	2,754,016	155	15·23
Assam[1]	56,243	5,477,302	6,126,343[1]	109	2·95
Burma[1]	236,738	7,722,053	10,490,624[1]	44	9·43
Smaller Provinces (5)	53,365	775,101	1,034,388[1]	19	21·71
Total, Provinces	**1,087,249**	**221,239,515**	**231,899,507**	**213**	**9·54**
(b) States—					
Haidrabad	82,698	11,537,040	11,141,142	135	10·11
Baroda	8,099	2,415,396	1,952,692	241	24·01
Mysore	29,444	4,943,604	5,539,399	188	13·03
Kashmir	80,900	2,543,952	2,905,578	36	5·46
Rajputana	127,541	11,990,504	9,723,301	76	14·50
Central India	78,772	10,318,812	8,628,781	109	11·37
Other Groups (7)	271,939	22,325,848	22,570,656[1]	83	9·89
Total, States	**679,393**	**66,075,156**	**62,461,549**	**92**	**11·37**
Indian Empire	**1,766,642**	**287,314,671**	**294,361,056**	**167**	**9·93**

ANNUAL TRADE.

	Mean of 1871–76.[2] Rupees.[3]	Mean of 1881–86.[3] Rupees.[3]	Mean of 1891–96.[4] Rupees.[3]
A. IMPORTS.			
Merchandise	345,791,500	535,694,700	718,369,700
Treasure	70,729,400	134,039,800	146,285,800
Total	416,520,900	669,734,500	864,655,500
B. EXPORTS.			
Merchandise	575,813,600	841,520,400	1,089,041,900
Treasure	17,027,600	12,462,000	53,663,400
Total	592,841,200	853,982,400	1,142,705,300
C. TOTAL TRADE.			
Merchandise	921,605,100	1,377,215,100	1,807,411,600
Treasure	87,757,000	146,501,800	199,949,200
Total	1,009,362,100	1,523,716,900	2,007,360,800

[1] Including areas not enumerated in 1891.
[2] Excluding tracts not enumerated at the Imperial Census.
[3] From April 1st to March 31st.
[4] The approximate mean sterling value of the rupee in the three periods respectively was 22·418d., 19·303d., and 14·60d. If these equivalents were used the total trade as regards India would be seriously misrepresented, and the great and steady growth of the exports and imports completely hidden, thus :—

	In pounds sterling at average exchange. 1871–76.	1881–86.	1891–96.
Imports, Total	38,907,000	53,866,000	52,600,000
Exports, Total	55,377,000	68,685,000	69,514,000

POPULATION OF CHIEF TOWNS.

	1891.	1901.		1891.	1901.
Calcutta	682,305	847,796	Jaipur	158,787	160,167
Bombay	821,764	776,006	Bangalore	180,366	159,046
Madras	452,518	509,346	Poona	161,390	153,320
Haidrabad (*Dekkan*) ..	415,039	448,466	Patna	165,192	134,785
Lucknow	273,028	264,049	Nagpur	117,014	127,734
Rangoon	180,324	234,881	Srinagar	118,960	122,618
Benares	219,467	209,331	Surat	109,229	119,306
Delhi	192,579	208,575	Karachi	105,199	116,663
Lahore	176,854	202,964	Trichinopoly	90,609	104,721
Cawnpore	188,712	197,170	Baroda	116,420	103,790
Agra	168,662	188,022	Dacca	82,321	90,542
Ahmedabad	148,412	185,889	Gwalior	104,083	89,154
Mandalay	188,815	183,816	Multan	74,562	87,394
Allahabad	175,246	172,032	Indore	82,984	86,686
Amritsar	136,766	162,429	Ajmer	68,843	73,839

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The very numerous official reports of the Indian Government and of the various provincial governments contain a vast amount of geographical information of the most authoritative kind.

II.—NON-BRITISH STATES IN INDIA

Portuguese India[1] (*Estado da India*).—The Portuguese possessions in India are under a provincial Governor-General, residing in Goa, and are divided into three districts: Goa, Damão, and Diu. **Goa** is a territory of 1,400 square miles on the strip of low ground on the Malabar coast and fringed by islands. It is bounded by the river Tiracol on the north, the western Ghats on the east, and Canará on the south. It is watered by many rivers navigable by small craft, and is consequently adapted for commerce and agriculture. The principal port is *Mormugão*, and the capital *Nova Goa*, or Panjim, is the seat of an old Roman Catholic Archbishopric. The climate is dominated by the monsoons, which give a dry season from October to March, and a rainy season during the greatest heat between April and September. The population of Goa is almost half a million; many of the people are the descendants of the Portuguese settlers of the sixteenth century. Salt making is an important industry. **Damão**, or Daman, consists of a small territory between the rivers Coileque and Calem near the coast about 100 miles north of Bombay, and of two enclaves in the British territory. It is irrigated by the river Damonganga which has its outlet near *Damão*, forming its port. **Diu** is simply a fortress (*Praça de guerra*) situated on the island of the same name at the extreme south of Kathiawar on the Gujarat coast. The Gogolá territory facing Diu and the Panikotta fort in the Simbor inlet both form part of the Diu

[1] By Captain Ernesto de Vasconcellos.

Governorship. In Portuguese India, inhabited by representatives of the different castes of the Hindu race, as well as by the descendants of the early Portuguese colonists, rice is largely grown and is the staple native food. Salt making constitutes one of the riches of all the divisions of Portuguese India. There are plantations of coco-nut and other palm trees. The forests are valuable for their timber trees, principally teak in Nagar-Avely, one of the enclaves attached to Damão.

French Possessions in India.[1]—By the Treaty of Paris in 1763 France lost the Indian Empire which had been founded by the genius of François Dupleix. There only remained five factories scattered along the Malabar coast and the Ganges delta; these are *Mahé*, *Karikal* and the capital *Pondicherry*, all on the Malabar coast, *Yanaon* and the station of *Masulipatam* at the mouth of the Godavery, and *Chandernagore* on the Hugli, not far from Calcutta. The whole area amounts to 200 square miles and the population scarcely exceeds a quarter of a million. The imports are insignificant and the exports consist mainly of oil seeds and blue cotton cloth, the weaving of which is the chief industry of Pondicherry.

Himalayan States.[2]—On the northern frontier of India the wild country of the southern slopes of the Himalaya has enabled two small native kingdoms, **Nipal** and **Bhutan,** to remain independent. They keep up relations with Tibet and China, but, although the territories are closed by treaty to Europeans, a British resident appointed by the Indian Government is maintained at each native court. This officer does not in any way interfere with the internal affairs. Nipal, the western State, is inhabited by the Gurkhas, a race of Rajput origin who dominate the remnants of earlier Mongolian peoples. The Gurkhas volunteer in considerable numbers for the Indian army, and under British officers they have proved to be admirable soldiers, never failing in courage and cheerfulness. The countries are very little known, their chief resources are cattle and forest-produce. The population of Nipal is estimated at from two to five millions, and that of Bhutan at about 50,000.

III.—CEYLON

By the Hon. John Ferguson, C.M.G.

Colombo.

Position and Extent.—The "pearl-drop on the brow of Ind," as Ceylon is poetically called from its outline and position, is believed by many to have been part of the Hebrew Ophir or Tarshish. It was called *Taprobane* by the Greeks and Romans, *Serendib* by the Arab voyagers, and *Lanka* "the resplendent" by the Hindus and eastern peoples. It lies to

[1] By M. Zimmermann. [2] By the Editor.

the south of India between 6° and 10° N., and between 79½° and 82° E., the greatest length of the island being 267 miles, and its greatest breadth 140. It is separated from India on the north-west by the Gulf of Manar, but nearly connected with it by the Manar and Rameswaram Islands and the coral reef known as Adam's Bridge. There is no channel across the reef deep enough for large steamers to pass, and surveys have been made for a projected railway to connect India with Ceylon, 35 miles of which would be on the island, 22 miles on the reef, and only 1 mile across the shallow channels.

Surface.—The maritime districts form a low, level strip round the island, widening to an extensive jungle-covered plain in the north and north-east, while in the centre of the southern part one-sixth of the surface is mountainous. The highest summit is Pedrotalagalla (8,296 feet), the next and more famous is Adam's Peak (7,353 feet). Many of the mountains are wooded to the summit, and their slopes occupied by tea, coffee, or cinchona plantations; but there are also great expanses of *patina*, or open grass land, and the scenery throughout the mountain region is very fine. The longest river, the Mahavillaganga ("Ganges" of Ptolemy), flows from an elevation of 7,000 feet in the Horton Plains, for 150 miles, to the sea at Trincomali; the other rivers are numerous but short. There are no true lakes, but large artificial sheets of water brighten and beautify the principal towns, and there are many ancient tanks, some of great size, a few of which have been restored. On the flat coasts there are several backwaters, expanding into large lagoons at Batticalao and other places. The tides are nearly imperceptible, but powerful ocean currents sweep along the coasts.

FIG. 255.—*Adam's Bridge, connecting India and Ceylon.*

Climate and Resources.—The climate is of course tropical, but the heat is moderated by the surrounding sea, and by the fact that the island lies in the path of the two monsoons, that from the south-west prevailing from June to September and the north-east from October to January. The hottest season is during the interval between the monsoons from February to May. The highest temperature at Colombo is 95° F., and the average 80°, while there is a rainfall of 88 inches, well distributed throughout the year. At the sanatorium of Newara Eliya, situated at an elevation of over 6,000 feet, the mean temperature is only 58°, and the rainfall 95 inches. The whole of the hill country has a charming climate from December to May.

With its fertile soil Ceylon is one vast garden full of fascination for the botanist and naturalist. It is the home of a large variety of palms and flowering trees, innumerable orchids, and other tropical plants. The fauna includes the elephant, bear, panther, monkeys, peacocks, parrots, and other birds of fine plumage, as well as numerous snakes.

The gems of Ceylon have long been famous, the rubies and sapphires from the mines, and pearls from the fisheries in the north. The only other mineral of value is plumbago (graphite), of which about 18,000 tons are annually exported.

People and History.—In B.C. 543 a prince from northern India conquered Ceylon, and a succession of 160 Sinhalese rulers followed, the last of whom was deposed in 1815. There are still a few hundred aborigines (Veddas) in the island, and there are many Tamils from southern India, who long ago conquered the north and east of Ceylon. The Sinhalese continue to form 70 per cent. of the population. The Portuguese reached Ceylon in 1505, and occupied the maritime parts for nearly a century and a half, until they were driven out by the Dutch in 1640, who in turn yielded to the British in 1796, by whom at the request of the native population the last Kandyan king was dethroned in 1815, and the island brought under one government. The island abounds in magnificent ruins of the great cities and temples of the ancient Sinhalese kings, the ruins being second in extent and interest only to those of Egypt. The beauty of the island has made it the theme of many legends, the Arabs looking on it as the home of Adam and Eve after their expulsion from the Garden of Eden, hence the name of Adam's Peak and Adam's Bridge. More than half the people are Buddhists in religion, and about one-fifth are Hindus. Education is spreading rapidly amongst all classes of natives, who are quick to see the advantages of learning the English language and Western ways. Missionary effort has been very successful amongst them.

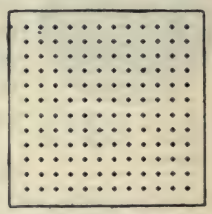

FIG. 256.—*Average population of a square mile of Ceylon.*

Industries and Trade.—Most of the inhabitants are engaged in agriculture, growing rice, fruit, palms, or cultivating vegetable gardens. Since 1840 British capital has created a great planting industry, Ceylon being the most prosperous of tropical plantation colonies. Nearly half a million Tamils, immigrants from southern India, are employed on plantations of coffee, tea, cacao, cinchona, spices and palms, and more than a million people are directly dependent on the work of these plantations. Tea is now the chief staple, Ceylon ranking third amongst the tea-producing countries of the world. There are 1,600 tea-plantations, covering 425,000 acres, and yielding 130,000,000 lbs. of tea annually for export. Twice as much ground is under coco-nut palms, a great part of the produce of which is used as food for the people and for the distillation of

the spirit known as arrack. A certain quantity of the nuts, oil, and fibre is exported, and the export of cinnamon is also characteristic. Sufficient rice is not grown for home consumption and there is a large import. The limits of the productive capacity of the island are still far from being reached. There is a customs tariff, which, as regards food products, is "protective," generally 6½ per cent *ad valorem*, but rising to 10 per cent. on rice from India.

The trade of the island is mainly with the United Kingdom and India; but there is direct trade also with the continents of Europe and Australia. Colombo, the chief port, is 6,500 miles from London by the Suez Canal, 4,800 miles from Cape Town, 3,300 miles from Albany, Western Australia, 1,600 miles from Singapore, and 1,400 from Calcutta.

Government.—Ceylon is now the first of the British Crown Colonies. It is ruled by a Governor appointed by the Colonial Office in London advised by a Council of five leading officials, and assisted by a Legislative Council, consisting of nine official and eight unofficial nominated members. The island is divided into nine provinces, each administered by a government agent and assistants, besides judges, magistrates and police. The laws are based on the Roman-Dutch system, modified by a century of British legislation.

FIG. 257. — *The Colonial Badge of Ceylon.*

Railways and Towns.—There are 300 miles of State railways on the 5½ feet gauge, connecting the principal towns and planting districts, and about half as much narrow-gauge mountain railway. *Colombo*, the political and commercial capital in the south-west, concentrates almost the whole external trade of the island, and is the most central port of the Indian Ocean—"the Clapham Junction of the Eastern Seas," where passengers change for India, China, and Australia. The magnificent artificial harbour is safe of approach and easy of entrance at all times. When the harbour improvements are completed it is expected that the headquarters of the East Indian squadron of the British Navy will be removed there from its present station at *Trincomali* on the north-east coast, a fine natural harbour but without trade or population. *Galle*, though still a considerable town, has lost its trade since the rise of Colombo as a steamer port. The old capital of *Kandy* is a beautifully situated highland town, with the extensive and attractive botanic gardens of *Peradeniya* in the neighbourhood. *Jaffna*, in the north, is a purely native town inhabited by Tamils.

STATISTICS.

	1881.	1891.	1901.
Area of Ceylon in square miles ..	25,365	25,365	25,365
Population of Ceylon	2,763,984	3,008,239	3,567,990
Density of population per square mile	109	119	141
Population of Colombo	110,502	135,000 [1]	158,093
„ Jaffna	—	—	33,860
„ Galle	31,743	33,505	37,326
„ Kandy	22,026	20,252 [2]	26,522

APPROXIMATE COMPOSITION OF POPULATION.

Race.		Religion.	
Sinhalese	2,250,000	Buddhists	1,085,000
Tamil	750,000	Hindu	680,000
Moormen (Arabs, &c.)	210,000	Mohammedans	222,000
Eurasians	25,000	Christians	350,000
Europeans	5,000		
Veddas	1,300		
Others	10,000		

ANNUAL TRADE (*in Rupees*).

	1871–75.	1881–85.3	1891–95.
Imports	52,480,000	53,664,000	74,466,000
Exports	43,970,000	39,960,000	70,497,000

ANNUAL TRADE (*in Pounds Sterling*).

	1871–75.	1881–85.3	1891–95.
Imports	5,248,000	4,472,000	6,770,000
Exports	4,397,000	3,330,000	6,174,000

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——— "Ceylon Handbook and Directory." Colombo, 1898.
H. W. Cave. "The Ruined Cities of Ceylon." London, 1897.
Ernst Haeckel. "A visit to Ceylon" (translated). London, 1883.

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1 Census gave 127,978, but known to be defective as regards floating population. An estimate in 1898 gave close on 150,000.
2 Limits of municipality altered.
3 Failure of coffee greatly affected trade.

CHAPTER XXVII.—INDO-CHINA

I.—SIAM

By H. Warington Smyth, LL.B., F.G.S.,
Late Director of the Department of Mining, Siam.

Siam, or Muang-Tai, a native kingdom between the British and French Asiatic dominions, may be divided into two parts, Upper and Lower.

Upper Siam constitutes the heart of the Indo-Chinese Peninsula. It extends north and east to the Me Kong or Cambodia river, which since 1893 has formed the boundary towards the French possessions of Tongking and Annam. On the south-east it is bounded by the French Protectorate of Cambodia, on the north-west by the British Shan States, and on the west by Burma. The largest and richest part of the country drains into the Gulf of Siam. On the west the Me Klawng flows briskly down from high jungle-covered mountain ranges, the home of the elephant, the rhinoceros, and the sambur. Farther eastward the great river of Siam, the Me Nam Chao Praya, and its branch the Tachin river, wind their tortuous courses through "attap" and mangrove swamps to salt water; and the Bang Pa Kong flows into the north-eastern corner of the gulf from the south-eastern ramparts of the Korat plateau, through the gold districts of Kabin and Watana, and the rich rice plains of Petriu.

The Me Nam Basin.—It is to the central river and its network of creeks that Siam owes her wealth. Rising in the Lao, or Siamese Shan, State of Nan in about 19° N. and 101° E., it is known for the first 150 miles of its course as the Nam Nan, and flows through a comparatively elevated valley, flanked and often diverted by forested ranges. About 17° N. the river emerges from the Lao district into the great plain of Siam. Three important tributaries come in from the west, and form with the main river the principal thoroughfares of the country for the essentially aquatic population which clusters along their banks. The upper waters of these rivers are diversified by high forest-covered ranges which raise their massive granite shoulders or fantastic limestone peaks to 6,000 or 7,000 feet above sea-level.

On these hills the teak tree (*Tectona grandis*), commercially the most important of the woods of Siam, and several varieties of *Dipterocarpus* and other huge forest trees abound. The villages can generally be seen afar by the bamboos, and the areca and coco-nut palms, which give them shade; rice, tobacco and cotton are the chief crops.

The climate of the mountain valleys is practically that of the Shan States

generally. After the rainy season comes the cool dry north-east monsoon, with the thermometer at night from 30° to 40° F., followed by the heat haze which lasts, with the thermometer at 90° to 105° by day, from February to the rains. The heat of the great alluvial plain is tempered by its proximity to the gulf, and while the rainfall is usually not great (60 to 80 inches), the thermometer seldom reaches 100° at the hottest season. The amount of moisture in the atmosphere, however, makes the climate of the lowlands peculiarly trying. The malarial fever of the plains is less acute than the forest fever of the northern valleys, but cholera and dysentery are more frequent.

The Me Kong Basin.—Only five streams of any importance flow from Siamese territory eastward to the Me Kong; the Nam Kok and Nam Ing in the extreme north, the Nam Loë and Nam Mun from the Korat plateau, and the Sangke or Battambong river, draining the Cambodian provinces into the great lake. Though navigable for some distance for the native dug-out canoe, all these rivers during the dry season are much impeded by shallows, tree trunks and the like, and in the rains they are turbid torrents of great depth and swiftness. The Korat plateau lying between the great eastern bend of the Me Kong on the 18th parallel, and the Dawng Phraya Yen and Dawng Rek ranges, which form its ramparts on the south and west, has a mean elevation of 600 feet above the sea. Large portions of it consist of unreclaimed swamps and salt wastes, or of open shadeless jungles of small hard-wood trees subject to inundation in the rains. The unsuitability of the Me Kong for navigation, and the pestilential tracts of forest surrounding its other sides have effectually cut off the plateau from the outside world, and excluded all incentives to trade.

Lower Siam.—Lower Siam occupies part of the Malay Peninsula. As far south as Kra in about 10° N. the main axial range of the peninsula forms the frontier towards British Tenasserim. The Siamese territory is but a narrow strip, and the granites of the axial range have so contorted and upheaved the sandstones and shales along their flanks that the country is very rough, and, being unsuitable for cultivation, is densely forested. Outlying masses of tilted limestones are very conspicuous, jagged fragments of the great limestone formation which has left its traces from Perak to Tongking, in the Mergui archipelago, and on the upper Me Kong. From the Pakchan estuary southward Siam rules from coast to coast, till the British Malay territories of Province Wellesley and Pahang are reached in about 5° N.

People and Government.—The influence exercised over the States of Kedah, Kelantan, and Tring Kanu in the south, is rather of the nature of a protectorate. In race, speech, flora and fauna they are essentially Malay. But north of the old State of Patani, from Singora in 7° N., the Siamese are the most numerous, and their language is used by the Malay as well as by the Chinese settlers.

In Upper Siam, besides the Siamese proper, the plain-dwellers include

the Mons (remains of the Peguan or Talaing invasions of the eighteenth century), Chinese, who largely intermarry with the Siamese, and smaller numbers of Annamites, Cambodians and Laos or Siamese Shans, representatives of the old Tai race from which the Siamese are descended and whose language they speak. These races (except the Chinese) for the most part profess Buddhism, but generally with considerable admixture of the old Indo-Chinese nature worship, and many traces of Brahmanism.

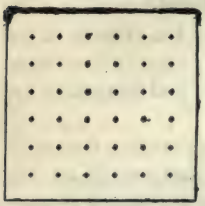

FIG. 258.—*Average population of a square mile of Siam.*

The races inhabiting the hills, whither they have been thrust by the incursion of the Shans, include some very primitive and interesting types; notably the Sakai and Samang, the aboriginal people of the Malay Peninsula, the Karens inhabiting the Burma frontier range north of lat. 13°, the Kas of the northern highlands and the Chongs of the Krat hills on the south-east. Tribes of semi-Chinese mountaineers occupy the Me Kong region, all hardy nomads living in small communities and possessed often of no small taste in dress. All these races show that gentleness of disposition, and the childish simplicity and cheeriness which are the chief characteristics of the unspoiled Indo-Chinese. The population of Siam, which is distributed mainly along the canal and river banks, may be roughly estimated at 9,000,000, of whom one-third are of Chinese origin.

Towns and Trade.—*Bangkok*, the capital, on the muddy Me Nam, contains a population which has been estimated variously from a quarter to half a million. Many of the people live on the water in floating dwellings, and on shore in narrow and ill-kept streets, but European influence begins to be apparent in both streets and buildings. The port is accessible to vessels of 12 feet draft. Of the other towns of Siam, perhaps fifteen attain, with their suburbs and neighbouring villages, a population of 10,000. Most of the other *Muangs* in the country fall short of 5,000 inhabitants.

The Government is carried on by the King, advised by a Council of twelve Ministers and heads of the various government departments, and assisted by a Legislative Council composed of the chief nobles. The principal Lao and Malay States are still ruled by their hereditary chiefs appointed or confirmed from Bangkok, under the supervision of Royal Commissioners appointed from the capital. Many of the public departments are under the charge of European officials; but Siam is independent of European political control.

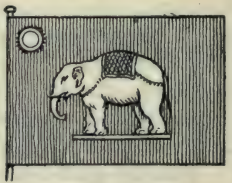

FIG. 259.—*The Siamese Flag.*

The chief export is rice, amounting to over 450,000 tons per annum. On the quality of the rice-crops depends the prosperity of the people and the whole import trade of the year. Teak comes next in value with about 50,000 tons annually. Tin mined by Chinese labour from the granites

of the Malay Peninsula is next in importance, and its export exceeds 3,000 tons annually. Salt and dried fish, bullocks, hides and horns, pepper, teal-seed, cardamoms, edible birds' nests, sapan, rosewood and ironwood, agilla and gum benjamin are the other principal exports. The chief trade of the country is done between Bangkok and Singapore or Hongkong, thence indirectly with Europe and China.

STATISTICS.

(*Estimates.*)

Area of Siam (square miles)	200,000
Population of Siam	9,000,000
Density of population per square mile	45
Population of Bangkok	300,000

ANNUAL TRADE OF SIAM (*in dollars*).

	1896.
Imports	10,500,000
Exports	15,100,000

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II.—STRAITS SETTLEMENTS AND THE PROTECTED MALAY STATES

By the Editor.[1]

The End of the Malay Peninsula.—The Straits Settlements with the Protected Native States mainly occupy the portion of the Malay Peninsula south of Siam, between 1° and 6° N. This part of the peninsula is separated from Sumatra by the Strait of Malacca. In the extreme south, Singapore Strait separates it from the smaller Dutch islands belonging to Sumatra, and serves as the channel of communication with the China Sea. The peninsula is mountainous, the main range rising 8,000 feet or more, but decreasing southward, trends on the whole from north-west to south-east, and a second series of ranges, more to the west, follows a direction generally parallel to it. From the central watershed rivers, which are necessarily short, flow to the coasts, east, south, and west. Much of the surface is undulating and covered with dense forests, varied with open grassy plains, and, in the lower parts, swamps and marshes. The geological structure is still very imperfectly known, but in the central chain the older formations associated with plutonic rocks appear to predominate. Tin is by far the most important mineral; rich deposits occur in various parts of the main range and its vicinity, constituting the richest and most extensive tin-field known, and yielding about one-half of the world's supply of this metal.

[1] Assisted by E. J. Hastings.

Iron is widely distributed, and there is some gold. The forests and jungles yield valuable timber, guttapercha, gums, bamboos and rattans; the coco-nut, areca and other palms flourish; rice is extensively cultivated in the swamps; gambier, pepper and tapioca are important plantation products; spices of various kinds grow freely; and coffee has been successfully introduced. The large wild animals include the elephant, rhinoceros, tiger, leopard, tapir, bison, several kinds of deer, and monkeys. The cobra, hamadryad, python, and other venomous snakes occur, while crocodiles haunt the rivers. Peacocks, birds of paradise, parrots, and pheasants are characteristic of the avifauna, and the edible birds' nest is collected in the cliffs and islands.

The climate is hot and humid, but owing to the free exposure of the country to the sea-breezes, the heat is less intense than in other countries so near the equator. The temperature varies little throughout the year. The rainfall is abundant, but there are no marked wet and dry seasons, both the north-east and the south-west monsoons bringing rain. The climate is, in general, not particularly unhealthy, though in some of the low parts malaria prevails.

People and History.—The inhabitants comprise Malays, Chinese, natives of India, here known as Klings; Sakeis and Samangs, remnants of the aboriginal inhabitants in the interior; Eurasians and Europeans. The Malays are mainly engaged in agriculture and fishing, while the Chinese, who now probably outnumber them, supply almost all the mining labour. Europeans (chiefly British) form a small minority of the population, and are generally engaged in the Government service or in mercantile concerns. The history of European influence in the Malay Peninsula dates from the capture of Malacca in 1511 by Albuquerque, who made it the centre of Portuguese dominion in the peninsula. Towards the end of that century the Dutch arrived and, after a long contest, culminating in the capture of Malacca in 1642, acquired the supremacy. It was not till near the close of the eighteenth century that a British settlement was effected. The East India Company occupied Penang in 1786 and Province Wellesley in 1800. In 1825, after the final loss of Malacca, the Dutch withdrew from the peninsula. In 1819 Sir Stamford Raffles, with wise foresight, founded Singapore on land granted by the Sultan of Johor, and five years later possession was obtained of the whole island. In 1826, Singapore, Malacca, and Penang were constituted the Straits Settlements, and in 1867 the administration was transferred from the East India Company to the Home Government, and the Straits Settlements became a Crown Colony. The Dindings were annexed in 1874; and as remote dependencies the Cocos or Keeling Islands were added in 1886, and Christmas Island in 1889. In 1887 the Sultan of Johor agreed to place his foreign relations in

FIG. 260.—*Badge of Straits Settlements.*

the hands of the British and to receive a Resident Agent, and in 1896 the native States of Perak, Selangor, Sungei Ujong, Pahang, and Negri Sembilan, which had previously been under British control, were united into a Federation under the administration of a British Resident-General.

Resources.—Agriculture and mining are the chief industries. Tin is the principal export (forming more than one-sixth of the total), next in importance are spices, gambier, and gum. Rice is the chief import; others are cotton goods, opium, fish and coal. The bulk of the import trade goes to the United Kingdom, India, Hongkong, and the Dutch East Indies, while the United Kingdom and Dutch East Indies take the first place for exports. Means of communication are still deficient, but several railways have been constructed in the native States, others are in progress, and good roads have replaced many of the old bridle paths.

The British Settlements.—Singapore Island lies south of the peninsula, separated from it only by the Old Strait, a narrow channel in parts less than a mile wide. The surface is undulating, and the scenery very picturesque; dense, and almost impenetrable, jungles cover a large area, but in the clearings, pineapples, gambier, and pepper are cultivated. *Singapore*, the capital, has advanced by rapid strides to a commercial port of the first rank. Singapore Roads afford good anchorage and shelter for vessels, and New Harbour, further west, has excellent wharfage. The port is protected by batteries and submarine mines. Singapore, like Hongkong, is an absolutely free harbour, without a Custom House, and carries on an enormous trade as the meeting-place of about fifty regular steamer lines from west, east and south.

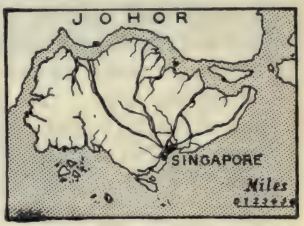

FIG. 261.—*Singapore Island.*

Malacca, at the time of the Portuguese conquest, was a large and important town, and a great centre of trade. Under the monopolising policy of the Portuguese and their successors, the Dutch, its prosperity decreased, and still more after the establishment of Penang. The opening up of the district has, however, given a fresh impetus to its growth. The district of Malacca is the largest of the settlements.

Penang (*i.e.*, "betel-nut"), formerly called Prince of Wales' Island, lies about 360 miles north-west of Singapore, and with Province Wellesley on the adjacent mainland is the most northerly of the Straits Settlements. The channel separating the island from the mainland is about two miles wide and forms a very good harbour. *Penang*, which succeeded Malacca as the chief centre of trade in the Straits, declined with the growth of Singapore. Its local trade is, however, large and increasing. Province Wellesley consists chiefly of an alluvial plain with wooded hills in the interior. Besides the betel-nut, spices of various kinds and rice are cultivated.

The Dindings, about 70 miles south of Penang, comprise the Pangkar or Dinding Islands, and a part of mainland opposite, lying north and south of the Dinding river.

The Keeling or Cocos Islands, a group of about twenty small forest-clothed coral islands, discovered in 1609 by Captain Keeling, lie about 500 miles south-south-west of Java. Coco-nut palms abound and yield the principal export.

Christmas Island, 200 miles south of Java, is an upraised coral atoll the coast of which is formed by the hard rocks on which the coral grew while they were beneath the surface of the water. A valuable product is the phosphate of lime of which a considerable part of the rocks is composed. The island is covered with exceedingly dense forest and undergrowth. Large tree-climbing land crabs and great red-brown rats are characteristic elements in the restricted fauna.

The Protected Native States.—These are all small States under native rulers who are advised or controlled by British Residents.

Perak, the most northerly, is about one-fourth larger than Wales. The coasts are low and bordered with mangroves. In the interior are mountain ranges and isolated groups rising in the main range on the eastern border to 6,000 and 8,000 feet. The principal river is the Perak, which with its tributaries drains the greater part of the country, and is navigable by boats for 165 miles. Tin is the most important mineral and the chief source of wealth ; gold, galena, and iron also occur, besides excellent china clay. Tea cultivation has been experimentally introduced. *Kwala Kangsa*, on the Perak, is the capital and seat of the British Resident. It is connected by road with *Port Weld*, whence a short railway runs inland to the mining centres of the rich Larut tin-fields *viâ* Taiping, and a branch joins it to the Selangor lines. The Southern port of *Teluk Anson* on the Perak is connected with *Ipoh* in Kinta, also a rich tin district.

Selangor, south of Perak, has inland stretches of undulating and very fertile country traversed by rivers, navigable to a greater or less distance, the most important being the Bernam on the Perak frontier. Tin-mining is the principal industry, but agriculture is advancing. *Kwala Lampur*, the large and flourishing capital and residence of the British Agent, is situated on the Klang, twenty-seven miles from its mouth, at the point of convergence of several roads leading from the tin-fields. A railway connects it with the river port of *Klang*, and still lower with the seaport of *Kwala Klang*, and other lines are being extended north and south from the capital.

Sungei Ujong (with which is included Jelebu) and **Negri Sembilan** (*i.e.*, the Nine States), lie south-east of Selangor and north of Malacca. The east is mountainous, traversed by the terminal section of the main range, and the west, hilly in parts. Tin-mining is the principal industry, but agriculture, for which the country seems well adapted, is advancing. Cattle are reared in the west. *Seremban*, on the Linggi, has the British Residency for Sungei Ujong ; it is connected by railway with the sheltered harbour of

Port Dickson. *Kwala Pilah* is the capital of Negri Sembilan, and residence of the British Agent.

Pahang, on the eastern side of the peninsula, is about the same size as Perak ; the low and swampy coasts are succeeded inland in the central part by more elevated land, with numerous conical hills. The main range on the western border is believed to contain in Gunong Tahan (probably over 10,000 feet), the highest summit in the peninsula. The Pahang river, which, with its tributaries, drains the whole central region, has a length of 350 miles, but is shallow, and in its lower course spreads out into lake-like expansions. Tin, gold and galena are the chief minerals. *Pekan*, at the mouth of the Pahang, is the capital.

Johor occupies the southern portion of the peninsula. A great part of the interior is covered with dense forest and uninhabited. Iron is widely distributed, but not worked, and some tin is found. Gambier, sago and pepper are the principal cultivated exports, besides timber and other forest products. *Johor Bharu* (*New Johor*), in the south, opposite Singapore Island, is the capital. There is daily communication by steam ferry and coach with Singapore. *Bandar Maharani*, a small town at the mouth of the Muar, is connected by a short railway with *Parit Jawa* to the south-east.

STATISTICS.

	1881.	1891.	1901.
Area of Straits Settlements (Colony), square miles	1,472	1,472	1,472
Population of Straits Settlements (Colony)	423,384	512,342	572,249
Density of population per square mile	287	348	392
Area of Federated Native States	—	26,500	26,500
Population of Federated States	—	418,527	676,138
Area of Johor	—	9,000[1]	9,000[1]
Population of Johor	—	200,000[1]	200,000[1]
Number of Asiatics in Straits Settlement (including Chinese, 227,889 ; Malays, 213,073 ; natives of India, 53,927 in 1891)		498,696	554,141
Population of Singapore (town)		186,300	228,555

ANNUAL TRADE OF STRAITS SETTLEMENTS THROUGH SINGAPORE
(*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	11,493,000	17,443,000	20,960,000
Exports	10,890,000	15,690,000	18,782,000

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III.—FRENCH INDO-CHINA

By M. Zimmermann,[2]
Of the "Annales de Géographie," Paris.

History and Exploration.—France obtained a footing in Indo-China in the year 1862, when a part of Cochin-China with Saigon and the Pulo Condor Islands were acquired from the Emperor of Annam, a vassal

[1] Estimates.

[2] Translated from the French by the Editor.

of the Emperor of China. The colony of French Cochin-China, to which the Protectorate of Cambodia had been added in 1863, was constituted in 1870. After a war from 1883 to 1885, the French protectorate over Tongking and Annam was recognised by China. Towards Siam, France obtained in 1893 the left bank of the Me Kong (the Lao country) together with rights over a zone 15 miles wide on the right bank. By a treaty in 1902 France gave up the right bank rights in return for territory west of the Me Kong and south of Pnom Dong Rek. The far eastern possessions as a whole have been known since 1888 as the General Government of French Indo-China (*Gouvernement Général de l'Indo-Chine Française*).

The era of scientific geography in French Indo-China opened in 1866 by the fine explorations of Doudart de Lagrée and François Garnier on the Me Kong. The necessity of entering into direct relations with China and the States of the upper Me Kong, which were reported to be very rich, was the motive of the labours of Garnier and of Jean Dupuis for Tongking, of Dr. Harmand, Néis, and particularly the Pavie expedition (1887-91) through the Lao country and the north of Indo-China. The Me Kong has been the special object of energetic exploration on account of the great importance of the question of its navigability. Since 1888 the hydrographic survey of the great river has been carried out with precision by a succession of naval officers, and its volume and the fluctuations of its level have been studied. Small gun-boats have been able to pass all the rapids with the exception of those of Khone immediately above Luang Prabang.

Extent, Configuration and Climate.—French Indo-China extends for 14° along the left bank of the Me Kong (9° to 23° N.), and its total area is half as large again as that of France, so that its different parts present many varieties in every respect.

The interior of **Tongking** (French, *Tonkin*) is a highland region varying in elevation from 2,000 to 4,000 feet; the surface modelled in gentle curves where the Devonian schists prevail, but often presenting a wild and broken appearance where the hard Palæozoic sandstones, beneath which lie deposits of coal, form the surface. The deep bays and gorges of the limestone region are now, as they have always been, haunts of pirates. These ancient rocks, forming a continuation of Yunnan, encircle the huge delta of the Red River and the Thai Binh, which has an area of 5,800 square miles. It contains almost the whole population of the country; and its uniform clayey surface, hardly broken by a few limestone crags, is covered with crops mainly of rice. The climate is tropical, deluges of rain falling after the month of May, flooding the Red River and raising its level 20 feet; but with a clearly marked winter, when temperatures from 43° to 45° F. occur at Hanoi, and frost is known in the higher land.

The skeleton of **Annam** consists of a granitic mountain-chain in the form of an arc stretching from Tongking to Cochin-China and running close to the coast of the China Sea. This barrier cuts off the interior from access to the coast; it rises to heights of from 4,000 to 9,000 feet and is notched

by few passes, the most important being that of Ailao between Kwang-tri and the Sebang-hien, 1,000 feet above the sea. The range is covered with forest and occasional marshes, which make it still more difficult to communicate from the coast with the Me Kong, the interior plateau of the Lao country, and the stretches of denuded sandstones and open forests of the plateau of Boloven and Attopeu. The seaward slope of the chain is trenched by short coast rivers forming small valleys in which most of the population is concentrated. The coast, bordered by dunes and lagoons, offers scarcely any anchorage unless it be in the Bay of Turan. The climate is intermediate between that of Tongking and of Cochin-China; the rainy season corresponds to the north-east monsoon occurring not in summer but from September to December.

Cochin-China and **Cambodia** consist mainly of low alluvial land formed by the floods of the Me Kong and the Donnai, above which only a few masses of granite project. The climate is quite tropical, with a uniform high temperature and a rainy season in summer. The ancient centre of the Cambodian kingdom was the great Lake Tonlé Sap, a sort of natural regulator of the summer floods of the Me Kong. At a very remote period human settlements had been formed in the marshy ground subject to periodical floods around this lake. The discovery of prehistoric remains of a remarkable character in the same region shows that it was also the seat of the early Khmer civilisation. In the same way as Egypt is a gift from the Nile the whole of Lower Cochin-China is a present from the enormous Me Kong, which flows down loaded with the silt that has been worn from the mountains of Tibet. In its upper course it struggles through the fissured limestones of southern China, spreads out on the sandstone plateau of the Lao country, and at the end of its course of nearly 2,500 miles it forms one of the largest deltas of Asia. The transition between each of the great geological divisions which it waters is marked by the formation of rapids or waterfalls, and thus it happens that the Me Kong does not play the important part as a channel of communication which its great length and vast volume seem to mark out for it.

FIG 262.—*The Divisions of French Indo-China.*

People.—The principal ethnic group in French Indo-China, both from the political and social point of view and from its number, is that of the *Annamites*. They principally occupy the low lands of the east of the peninsula, including the deltas of Tongking and Cochin-China and the coast

plain of Annam. They are a race of tillers of the soil, of small stature and feeble appearance, but are hard-working and peaceable. From the earliest centuries of our era they have been under the influence of the Chinese, whom they resemble in their religious beliefs (ancestor-worship, Confucianism and a modified Buddhism), and in their written language. The spoken language, on the contrary, is entirely different, although, as in Chinese, the musical value of the tones is of great importance. Annamite society is characterised by absolute equality; the family is strongly organised and paternal authority has preserved all its strength. The *Cambodians* or *Khmers* were a powerful nation in the eighth century; their ancient greatness is attested by many magnificent ruins, including in particular those of Angkor-wat, situated not far from the great lake Tonlé Sap. Much taller and stronger than the people of Annam, the Khmers are yet an apathetic people, and were probably destined before the French occupation to be subject to the yoke of their more energetic neighbours the Annamites or the Siamese. The influence of India appears very clearly in their social organisation, which is based on the system of caste; in their religion, a mixture of Brahmanism, Buddhism and old animistic beliefs; and in their ancient monuments. Finally the *Lao* people and the inhabitants of the *Shan* States form a branch of the Thais, the same race as the Siamese and the Burmese. A puzzling group of this race, taller and less yellow than the Annamites and of a much less marked Mongolian character, also inhabits the high valleys of Tongking under the name of *Thos*. They are a gentle and an idle people, and appear to be of very mixed descent. Besides the three great groups, some very primitive tribes, who seem to be descended from the ancient inhabitants of Indo-China driven out by conquering races, are found scattered through the forests and on the barren mountains. These tribes are called *Peunong* amongst the Cambodians, *Moi* by the Annamites, and *Khas* by the Laos, each of these names meaning simply savages. Some of them resemble the Indonesians of the Sunda Islands, and especially the Dyaks of Borneo. There is also a Malay tribe known as the *Tsiam* and the *Meos* in the high regions of the north, who seem to have come recently from southern China where they were known as *Man*. The remnants of ancient peoples who have been driven to take refuge in the wooded and unhealthy mountains have best preserved their original character, those living in the more open ground have been absorbed by Chinese civilisation. The Chinese dominate the native trade of the whole of French Indo-China.

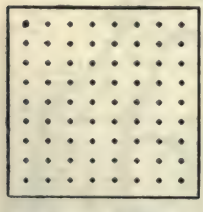

FIG. 263.—*Average population of a square mile of French Indo-China.*

Productions.—Cochin-China is at present the most prosperous part of the French Asiatic possessions, as it has been colonised for the longest time. It produces scarcely anything but *rice*, more than three-quarters of

the cleared land being devoted to that crop, which is favoured by the periodical inundation of the country and the remarkable uniformity of the seasons. During the twenty years preceding 1895 the production has increased six-fold, and since 1899 the annual export has exceeded 600,000 tons, forming 90 per cent. in value of the total exports of the country. It is sent mainly to Hongkong, Singapore and to France. The other parts of French Indo-China are still only to be viewed as lands of promise. In **Annam** there are untouched forests of teak, ironwood and lacquer trees, covering the great mountain range and the plateaux; the valleys on the coast only produce a little rice on account of the want of suitable low ground, but they already yield a certain amount of cinnamon, pepper, cotton (at Than Hoa), sugar-cane, coffee in the plantations near Turan, and tea; the last two products appear to have some future before them. **Tongking** produces rice principally, but on account of the density of population, notwithstanding a very large production, the quantity available for export is much less than from Cochin-China. Silk, cotton, oils and lacquer are also produced, and much is hoped from the cultivation of coffee, tobacco and jute. The elevated northern districts of Luang Prabang, Tranh-Ninh and Sib-Song-Panna are on the border of the tropical and temperate regions, and produce some of the products of each. They promise ultimately good returns from the forests of teak and other valuable woods, from gum-benjamin, cardamoms, cinnamon and tea plantations; while there are great undeveloped mineral deposits including gold, iron, antimony, copper and lead.

The thinly peopled **Lao** country, poorly provided with means of communication, without any great demand for trade on the part of its inhabitants, and still tributary to Siam commercially, is in the very infancy of colonial enterprise. It is known, however, that cotton grows there without being cultivated.

All along the coast of the China Sea the fisheries are actively prosecuted, whole fleets of junks, usually manned by Chinamen, carrying on the trade. Coal mining has already made some progress in Tongking, the coal of Hongay being exported to the extent of 276,000 tons in 1899, and going to Hongkong, Canton, Singapore, and even San Francisco. The Coal Measures of the Bay of Along appear again on the Red River at Lao Kay, near the frontier.

Trade and Towns.—As in many of the French Colonies, the trade of Indo-China is mainly carried on with foreign countries. The imports of cotton yarn, textiles, manufactured articles, machinery and petroleum are of Australian, British, American and even Japanese origin. Energetic efforts have recently been made to open up internal trade in two directions. First new transverse routes are being opened across Annam in order to reach the Lao country and the Shan States (Luang Prabang), starting from Vinh, Turan and Saigon. A railway between Saigon and Mytho is being extended to Tantinh. Navigation on the Me Kong has been

facilitated by works in the Island of Khone and by laying down buoys. The second object is to develop trade between Tongking and Yunnan by the Red River, and so stimulate commerce with southern China. For this purpose a steamer service has been established on the Red River, various treaties have been made with China, French consulates established at Mong-tse and Long-cheou and a port has been acquired in the peninsula of Lei-chu opposite Hainan. A railway runs from Haiphong to Hanoi and by Phulang-thuong and Lang Son, to the frontier of the Chinese province of Kwang-si. Another line joins Hanoi to Ninbinh, and will be prolonged to Vinh.

In Tongking the life of the country is mainly concentrated in the capital *Hanoi*, and in *Haiphong*, the port which monopolises the whole external trade in spite of its natural disadvantages. In Annam the port of *Turan* (Tourane) is one of the few really good harbours on the coast, and is near coal-fields which assure its future. *Saigon* in Cochin-China, where there is a French population of 2,000, not only concentrates the trade of Cambodia and southern Indo-China, but is one of the smartest and most attractive towns in the Far East.

STATISTICS.

(*Estimates about* 1900.)

	Area, sq. miles.	Population.	Density of Population per sq. mile.
Tongking	46,400	7,500,000	162
Cochin-China	22,000	2,300,000	145
Cambodia	37,400	1,500,000	40
Annam	52,100	6,400,000	121
Laos Country	98,000	500,000	5
Total of French Indo-China	255,900	18,200,000	71

ANNUAL TRADE OF FRENCH INDO-CHINA (*in pounds sterling*).

	1893.	1900.
Imports	3,060,000	7,440,000
Exports	4,124,000	6,240,000

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CHAPTER XXVIII.—THE CHINESE EMPIRE

By George G. Chisholm, M.A., B.Sc.

I.—CHINA PROPER

Position and Extent.—The Chinese Empire is made up of China Proper and the bordering provinces of Manchuria, Mongolia, Eastern Turkestan, and Tibet. The total area is above 4,000,000 square miles, and the empire occupies the greater part of central and eastern Asia ; but the importance of China Proper much exceeds that of the vast thinly-peopled provinces which lie to the west and north.

China Proper is a country which, in spite of its vast extent (above 1,500,000 square miles) and great diversity of physical features, is on the whole well marked off by natural boundaries (bounding tracts, however, rather than boundary lines) from surrounding countries. And although including foreign ethnical elements in considerable numbers, it is yet inhabited by a people remarkably homogeneous in race, language, customs and ideas. On the north, the boundary runs along mountains or through sparsely peopled steppes, separating it from Mongolia and Manchuria. There are extensive remains of a great wall built about 212 B.C., which long formed the frontier on the north, and still does so exactly or approximately in the west, though now China Proper extends far beyond it east of the middle portion of the Hwang-ho. On the west, China is bordered by the lofty tableland of Tibet. On the south-west it is divided from the Indian peninsula and Burma by a succession of lofty mountain ranges and profound valleys. On the south, the boundary runs in part right across these mountains and valleys, and partly along the water-parting between the basins of the Si-kiang (West River) and the Song-koi (Red River).

General Configuration.—Broadly speaking China is composed of two extensive low plains in the north-east, and of mountainous and hilly country in the west and south, together with an isolated mountainous peninsula between the Gulf of Pechili and the Yellow Sea. The two plains differ very greatly in extent. The larger extends from the Gulf of Hangchou to the mountains north of Peking, a total length of about 700 miles ; the greatest width, near the parallel of 32° N., being about 400 miles. A large part of this plain is so low and level as to be very liable to inundation, the rivers being only with difficulty restrained within their banks. The most destructive of such inundations have been caused by the

changes in the bed of the Hwang-ho, "China's sorrow," which has altered its course, or had its course altered, at least eleven times within the last twenty-five centuries, flowing now north, now south of the mountainous peninsula of Shantung. The minor plain is that of the middle Yangtse and the lower Han, comprising all the lake district of the region of the great zigzag of the Yangtse between Ichang and Kiukiang. It is cut off from the larger plain by the comparatively low hills containing the water-parting between the Yangtse and the Hwai-ho. Both in length and breadth it measures about 140 miles.

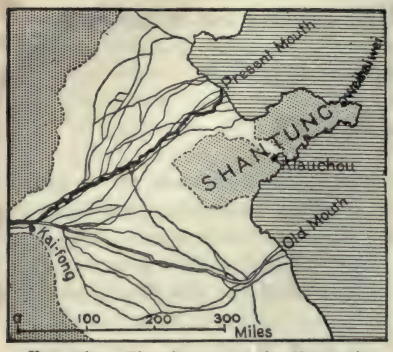

FIG. 264.—*The changes of the Hwang-ho*

The mountainous country in the west and south is partly composed of an intricate system of mountain chains and spurs, with narrow intervening valleys, and partly of more undulating country with broader valleys, the latter type predominating in the south-east. The highland regions of the north and south present another contrast. The valleys of northern China are all to a large extent filled with loess. This is an earthy deposit generally of a yellow colour, differing from clay in being highly calcareous and from marl in being remarkably porous, and that in a peculiar manner. The pores are vertical, and are believed to be due to the former presence of the stems of plants rich in lime. This characteristic brings about a tendency to weather into vertical precipices. Equally characteristic of the loess are horizontal terraces, a structure not so easy to explain. The loess of China is believed to be due to the gradual accumulation of dust blown from the interior tablelands of Asia. In some places this fertile soil is cultivated even at the height of 8,000 feet. In southern, or at least south-eastern China, on the other hand, the higher slopes are generally too steep for cultivation, and, notwithstanding the warmer climate, cultivation is in most parts confined to the zone below 2,000 feet; but in the upper part of the basin of the Yangtse-kiang, in the region where numerous tributaries converge from north and south before the great bow-like bend to the north, the presence of a rich red soil, filling what is hence known as the Red Basin, has caused most of the hill and mountain sides to be terraced for cultivation to their tops.

From an orographical point of view a marked dividing line between the mountains of northern and southern China is formed by the easterly continuation of the Kwen-lun range. In China Proper this runs for the most part nearly due east and west, but finally turns round to the south-east.

In the west these mountains are known as the Tsinling-shan, and in the east as the Funiu-shan. Their importance arises chiefly from the fact that they form a serious barrier to communication between north and south, especially in their middle portion, where they cut off a fertile populous plain, the valley of the Wei, on the north, from the whole of southern China. In this section there are only two frequented passes separated by an interval of about two hundred miles, and crossed merely by difficult bridle paths. The eastern pass, whose summit is upwards of 4,000 feet above sea-level, is reached by a route running south-east from Singan, the chief town in the valley of the Wei, which is thus brought into connection with the plain of the middle Yangtse by way of the valley of its chief northern tributary, the Han. It forms the division between the Tsinling-shan and the Funiu-shan. The western pass connects the valley of the Wei with the Red Basin, but the road across it, after descending into a parallel valley (the upper part of the Han), has to cross another difficult bridle path before that basin is reached. The passes further west, also crossed by mere bridle paths, are less important, as they connect less populous regions.

Configuration of Northern China.—North of the line of separation formed by the series of ranges, the mountainous areas of China are naturally divided into two great sections, respectively west and east of the deep and narrow gorge in which the middle Hwang-ho plunges and rushes from north to south till it turns sharply eastwards on receiving the Wei. The western section is a much diversified loess-covered region, through which there runs only one important highway leading north-westwards from the Wei valley, and finally running along the northern or north-eastern base of the Nanshan range to Mongolia and Eastern Turkestan. The last portion of this route is through a narrow neck, where the lofty range just mentioned, rising to about 20,000 feet in height, forms the boundary between China Proper and Tibet and the Great Wall forms that between China and Mongolia. This neck, at all times the great avenue from central and western Asia to the north-west of China, is known to the Chinese as the Yu-men or Jade Gate, from the fact that it is by this route that that much prized mineral has been introduced into the country for ages.

The eastern section of the northern highlands of China is as diversified as the western. It is composed, first, of a tract between the gorge of the Hwang-ho and the great plain, in which the mountains have a more or less southerly trend, and are divided into two minor sections by the important valley of the Fen-ho, the mouth of which communicates with that of the Wei, and, second, of a more northerly tract in which the ranges have a north-easterly trend gradually becoming more easterly towards the east, where they form a series of terraces, shutting off Mongolia on the north from the great plain on the south.

Configuration of Southern China.—The mountainous part of China south of the Tsinling-shan and Funiu-shan may be conveniently divided first into two regions, respectively north and south of the Yangtse. The portion on the west adjoining Tibet and extending as far east as the bridle path leading into the Red Basin, is a wild and intricate region with a scanty population. East of this bridle path there is first a range called the Tapa-shan running eastwards and sending off numerous spurs northwards to meet those running south from the parallel range of the Tsinling-shan, so that the intervening valley of the upper Han is in most parts extremely narrow, and the course of the river itself is interrupted by a continuous series of rapids. Southwards from this a series of more or less parallel ranges runs to the Yangtse partly through and partly to the east of the Red Basin, forming a great hindrance to communication between that rich region and the eastern plains.

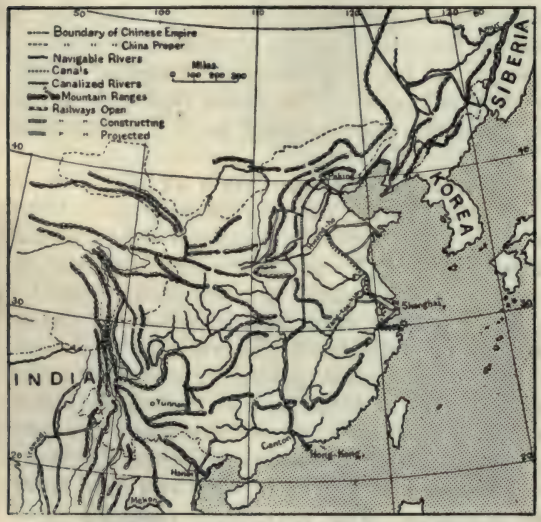

FIG 265.—*China, showing the Chief Routes and Mountains.*

South of the Yangtse there is in the west an elevated region with an extremely diversified surface, which may be called the plateau of Yunnan. Almost everywhere even the valley bottoms, all of small extent, are above 5,000, some even above 7,000 feet in elevation, and on all sides there is a sharp descent to the surrounding regions. To the east the mountains are so arranged as to form fairly well-marked isolated river basins belonging in the north, mostly to the great basin of the Yangtse (they include the Kwei, the Tungting lake, and the Poyang lake), in the south to that of the Si-kiang, and in the south-east to minor independent streams. In the south-east the most important independent basin is that of the Min. The general name of Nan-shan ("Southern Mountains") is given to the highlands separating the northern from the southern and south-eastern basins. Just east of the Red Basin the spurs of these mountains advance in many places close up to the banks of the Yangtse, thus impeding communication eastwards on this side also, while a further hindrance is presented by the series of gorges

obstructed by more or less difficult rapids through which the river flows between Chungking and Ichang.

Geology and Minerals.—The geology of China is, as a rule, very imperfectly known, especially in the south. The Tsinling-shan and Funiu-shan systems are nearly as marked a dividing line from the geological as from the orographical point of view. They are almost entirely composed of ancient granites, gneisses, and other crystalline rocks, along with various eruptive rocks. To the north, underneath the loess, the prevailing rocks belong to the Carboniferous system, while to the south there extends a vast area of Jurassic strata embracing all the Red Basin. At various places on both flanks of the dividing ranges, especially in the east, there are extensive deposits of what have been designated the Sinic (Chinese) formations, which lie at the bottom of all the fossiliferous strata of China, and are held to correspond with the Cambrian and Huronian deposits of Europe and America. These reappear largely along with ancient non-fossiliferous crystalline rocks in other mountainous regions of the country.

China is remarkably rich in minerals, above all in coal. In the Carboniferous area of the north the Coal Measures crop out in many places, and the largest known coal-field in the world is found among the highlands in the south-east of the province of Shansi, where thick seams of excellent anthracite extend for a length of about 200 miles, with a varying breadth. This region also abounds in fine iron ores, in limestone, and in potter's clays. The only drawback is the difficulty of access. The west of Shansi is almost equally rich in bituminous coal, and many detached coal-fields are known to exist further west beyond the Hwang-ho. Other small, but important coal-fields lie among the mountains both east and west of Peking, and in the west of Shantung. In the south of Hunan, on the rivers Siang and Lei, the deposits are much more important, for although the coal is not generally of very good quality, it is more largely worked than anywhere else in China, owing to the ease with which it can be conveyed by water to the towns on the Yangtse. At various places on or near the Yangtse there are other small coal-fields, and the province of Sechwan is very rich in coal of post-Carboniferous age, which is largely mined and carried by river to different parts of the Red Basin. Among other important minerals may be noticed copper, which is scattered all over Yunnan, a province which also contains silver, lead, tin and gold —the tin in an isolated high valley, not far from the frontier of Tong-king in the south-east, the gold in the south of the province. Salt occurs in the south-west of Shansi, near the abrupt angle of the Hwang-ho, in the middle of the Red Basin, and in the south-west of Yunnan.

Climate.—The main characteristics of the climate of China depend, first, upon its situation on the east side of the greatest land-mass in the temperate zone of the northern hemisphere, and second, upon its situation within

the region subject to monsoon winds. The first of these circumstances explains the character of its climate as regards temperature. Throughout it is a country of extremes, or at least of a high range of temperature, hot summers alternating with cold winters, though, of course, the extremes are much greater in the north than in the south, where part of the surface lies within the torrid zone. The temperature in January averages 55° at Canton in the south, and only 23° at Peking in the north, while in July the average for Canton is 82°, and for Peking 79°; the average for the whole year is 17° lower at the northern than at the southern station. Throughout China there is that predominance of summer rains which is one of the distinguishing features of monsoon areas, but the contrast between winter and summer rain is much more marked in the north and south than it is in middle China. This alternation of rainy and dry seasons necessarily brings about a corresponding alternation of high and low water in the rivers, and where the physical configuration leads a multitude of streams into one channel the differences between the summer and winter level in the main river are enormous. At Ichang, just below the rapids of the Yangtse, a difference of nearly 48 feet has been observed in the level of the river, and the ordinary annual difference is not less than 40 feet. The period of high water lasts from the beginning of July to the early part of October.

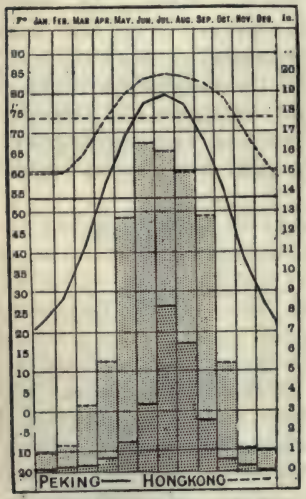

FIG. 266.—*Temperature and Rainfall Curves for Peking and Hongkong.*

Flora and Fauna.—Among the native vegetable products the first place may be assigned to the bamboo, not, of course, as being peculiar to this country, but on account of its universal practical importance, especially in the south. More peculiarly Chinese are the wax tree, the tallow tree, the paper mulberry, the camphor and varnish trees, cassia, and the sweet orange, which was introduced from China into Europe only after direct trade had been established by the Portuguese. One of the most noteworthy circumstances regarding cultivated products is that the coincidence of the rains with summer temperatures enables some crops that are in most parts of the world confined to tropical and sub-tropical latitudes to be grown with success in northern China. Hence cotton is as characteristic of this part of the country as wheat and the ordinary European cereals, together with beans and other pulses. Opium also is now largely cultivated in the extreme north. In southern China the characteristic products are rice (grown even in the high valleys of Yunnan at 6,000 feet and

upwards), tea, silk, sugar, and opium. Besides the silk obtained from "worms" fed on the leaves of mulberries cultivated for the purpose, large and rapidly increasing quantities of silk are obtained from wild caterpillars which feed on the leaves of forest trees; chiefly in the north where extensive forests are still found.

In the greater part of China the larger wild animals have been exterminated by the progress of civilisation, but in the wilder mountainous tracts there are elephants, rhinoceroses, and tapirs, a peculiar species of tiger, several kinds of leopards, bears, and badgers, and wolves in some parts, *e.g.*, Yunnan, are still numerous, bold and destructive.

The Chinese fisheries both in the sea and inland waters are very productive; a characteristic mode of fishing is with the aid of cormorants, which are prevented from swallowing the large fish that they catch by rings or pieces of string round their necks. In the inland waters the breeding of fish for food is largely practised.

People, History and Language.—The people, of Mongolian stock, who have spread their language, institutions, and ideas, with remarkable success over so large and diversified a country, are known to have been originally immigrants. They entered the country at a very remote period, thousands of years before the Christian era, by the north, and almost certainly by the avenue known as the Yu-men (p. 523). The place of their original seats is still a matter of dispute, but it is generally admitted that they were in western Asia, that the oases of Eastern Turkestan formed prolonged halting-places on their progress eastwards, and that accordingly they were skilled in irrigation work before they entered China. The first areas settled by them in which they had room for expansion, and the first seats of empire were the freely intercommunicating valleys of the Wei and the Fen (Shensi and Shansi). The empire was frequently divided, but whether under one or several rulers the Chinese language and institutions gradually spread eastwards and southwards. Not till after the building of the Great Wall (212 B.C.) did it permanently extend beyond the Yangtse-kiang. In later times the extension has been less by conquest than by the gradual process of ousting by superior assiduity the non-Chinese races who were not assimilated and absorbed. Among the mountains in the south-west and south there are still some considerable tracts occupied by unabsorbed and unsubdued descendants of older inhabitants, generally known by terms of contempt applied by the Chinese as *Miautse* or *Mantse*.

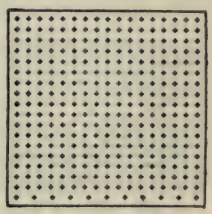

FIG. 267.—*Average population of a square mile of China Proper.*

The unity of the Chinese language is apparent rather in its written than in its spoken form. The writing is not alphabetic but ideographic—that is there is a different character for every root idea. Hence the knowledge

of about ten thousand different signs is required for the complete knowledge of the Chinese language. These signs have the same meaning in all parts of the country, and even in Korea and Japan, but the equivalent sounds differ greatly in different dialects, just as the Arabic numerals have the same meaning though different names in all European languages. The confusion of the spoken language is, however, to some extent reduced by the fact that the educated classes generally speak an official dialect.

Government.—The government combines a high degree of centralisation with the universal and long-established practice of popular government as regards local affairs. The central government is imperial, and the dignity of Emperor is hereditary in the reigning family, though not by any fixed rule of descent. The reigning emperor has the right to nominate his successor. The present dynasty, dating from 1644, is of Manchu origin. It was by this dynasty that the Manchu custom now universal in China, of wearing the hair hanging down behind plaited into a long queue, or "pigtail," was introduced. All government officials, known to Europeans as Mandarins (a term of Portuguese origin), are appointed in the emperor's name, but must be selected from those who have passed the necessary public examinations, which are open to all, and are more or less severe according to the rank for which they qualify. All Chinese institutions concur in impressing on the people respect for authority and the established order. None is more influential in this respect than the system of examination, for all of the examinations test merely the knowledge of the ancient Chinese classics first systematised by Confucius, and give no encouragement to the spirit of scientific inquiry.

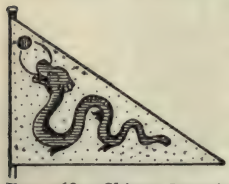

FIG. 268.—*Chinese Imperial Standard.*

What may be called the universal religion of China is a form of ancestor worship inculcated in these classics, and no religion incompatible with this idea has obtained a wide hold on the Chinese. The Buddhism of India and the native Taoism have both proved thus adaptable, and have many adherents. But this is not so with Mohammedanism, which is professed by some millions in the north-west and south-west, and Christianity, which counts a few hundred thousand adherents, chiefly in the west; hence Christians and Moslems are looked upon as foreign elements by the great body of the Chinese.

Industries and Trade.—The prevailing and most esteemed occupation in China is agriculture. In token of the honour in which this industry is held, every year at the vernal equinox, the emperor at the capital, and his representatives in other parts of the empire with their own hands hold the plough and sow the seeds of the chief cereals. In every way the climate encourages farm work. The regular winters maintain the energy of the people. The coincidence of warmth and moisture in summer invites

and rewards the labour of the husbandman. Nowhere else in the world, perhaps, are such scenes of quiet but varied and charming rural industry presented as in some of the more favoured valleys of China. Pleasant farm-houses roofed with red or blue tiles are scattered about the valley bottom, or amidst the carefully cut terraces on the hill slopes. From the river, on which there is a ceaseless coming and going of large and small boats, water is raised by waterwheels, driven by the labour of men or buffaloes, to a canal above, from that to a second, a third, a fourth, a fifth, until it reaches the tops of the hills, and it is made to impart life and freshness to every rood of soil in its descent. Seen from above, these canals seem like bands of silver encircling an infinite variety of green. In the most abundantly irrigated tracts there is the vivid and tender green of the rice-fields, or the darker verdure of the sugar-cane. Elsewhere are tea-plantations, fields of cotton decorated with their large yellow blossoms, rows of orange trees, clumps of palms yielding fibres and other useful products, oil trees and tallow trees, and many a thicket of bamboos with panicles waving in the wind at the height of twenty to thirty feet above the ground.

Chinese manufactures are for the most part domestic, and the few that have long been localised and carried on on a large scale are mainly those dependent on supplies of mineral products such as potter's clay (including china-clay) and iron ore. The principal textiles of the country—silk, cotton, and rhea fibre or China grass, the last being largely used for summer clothing—are mainly worked up by the women at home or in small establishments. Quite recently European influence has led to the introduction of steam machinery; silk filatures worked by steam have been set up in the silk-producing provinces, and cotton mills have been erected round Shanghai and elsewhere with such success as to give great promise of rapid progress.

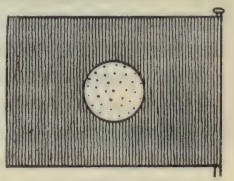

FIG. 269.—*Chinese Merchant Service Flag.*

The only important articles of export from China are such as have a high value in proportion to their bulk, or such as can be produced in considerable quantity within no great distance of the seaboard or the great waterway of the Yangtse. For thousands of years silk and silk fabrics have held the first place of importance. Almost equally long, porcelain, a Chinese invention, has been an important export to the west, though now that the industry has been introduced elsewhere it takes a subordinate place. During the nineteenth century the second (occasionally the first) place has belonged to tea, which still holds that rank among the exports, though latterly the amount exported has diminished in consequence of the severe competition of India and Ceylon. Much of the tea is exported by land, large quantities of it being compressed into "bricks" or "tablets." Brick-tea is usually of inferior quality, and is chiefly consumed in Tibet and Mongolia; but tablet-tea is of high quality and finds its chief market

in Russia. Among other noteworthy exports are raw cotton (chiefly sent to Japan), beans and bean cake, straw braid, mats and matting, skins, hides and furs. The chief imports are cotton yarn and tissues, opium, rice, metals, and a variety of manufactured articles, including in recent years rapidly increasing quantities of machinery. Foreigners are allowed to settle for trade and introduce goods directly only at certain ports, mostly fixed by successive treaties since 1842, and hence known as treaty-ports; these are now thirty-four in number. The collection of the customs at these ports is entrusted to a foreign board, called the Imperial Maritime Customs, the head of which is an Englishman.

Means of Communication.—The cause of the limitation of the exports of China is the remarkable defectiveness of the means of internal communication, except where there are convenient waterways. In northern China such waterways are the exception, though during the summer several rivers, ultimately uniting in the Pei-ho above Tientsin, are available for transport. The great northern river, the Hwang-ho, is too rapid and too shallow to be a convenient waterway, and is navigated only by small boats in sections of its course. An important artificial waterway, the Grand or Imperial Canal, runs from Hangchou in the south to Tientsin in the north. It was constructed early in the seventh century, chiefly for the conveyance of rice from the southern provinces as an imperial tribute, and it still forms a fine waterway navigable by boats of at least five feet draught in its southern section as far as the old bed of the Hwang-ho. In southern China, including all the basin of the Yangtse, the rivers are the principal means of communication, but many of them have their courses so impeded by rapids that the cost of transport is greatly raised, and navigation is rendered so difficult that hardly anywhere out of China would it continue to be practised at all. The one great inland waterway is the Yangtse, which is without a parallel in the world in respect of the length of navigation it offers for ocean steamers through a densely peopled country. Vessels of over 1,000 tons burden can reach Hankow, 680 miles, or three days' steam from the sea. Steamers of about 600 tons can ascend to Ichang, just below the rapids, while 150-ton boats are the largest that can pass the rapids. The ascent of the last stretch, about 400 miles, takes nearly three weeks. A further difficulty is created by the fact that the stretch between Hankow and Ichang is easiest at high water, while the rapids can scarcely be ascended at all during that period. The Han, a great left bank tributary of the Yangtse, is comparatively easy of navigation in its lower course, where it flows in a southerly or south-easterly direction, but not higher up. Of the southern tributaries the best waterway is the Siang-kiang, the chief feeder of the Tungting Lake. It is said to offer a course ten feet in depth as high as Hengchou, about 140 miles due south of the lake, but above that rapids are numerous, as they are also in the Kan-kiang, the corresponding southerly feeder of the Poyang Lake. The navigation of the Si-kiang is much impeded by rapids above Wuchou.

Roads fit for cart traffic are very rare in the south, the principal wheeled vehicles being wheelbarrows. In northern China roads for cart traffic are more common, except among the mountains, where the few roads of this kind run in many places through long defiles so narrow that two carts cannot pass. In all parts of China accordingly the chief means of transport, where boats cannot be used, are pack animals (including camels in the north) and human porters. Hence, in spite of the extremely low cost of living, and the very small wages of labour, the cost of transport, where there is not good water carriage, is high, generally at least two or three times as high as in countries provided with railways.

The introduction of railways was long opposed by the official classes and regarded with dislike by the people. The first railway laid in China, that from Wusung to Shanghai, opened in 1876, was bought up and destroyed by the authorities in the year following. But this opposition has at last given way. Railways now run from Taku at the mouth of the Pei-ho to the Kaiping collieries, which have for many years been worked under European management, and thence through Shanhaikwan to Sinmin-tung and Niuchwang, and from Taku to Tientsin and Peking. The railway from Wusung to Shanghai has been relaid and was reopened in 1898. Great railway schemes have received official sanction. Among these are a line from Peking to Hankow, already partly completed, from which there is to be a connection by rail with the great anthracite field of Shansi, another from Peking southwards to Shanghai and Ningpo, one from Hankow to Canton, and one from Kaulun (opposite the island of Hongkong) to the same port. Telegraphs have for some years extended to the remotest parts of the empire.

THE PROVINCES OF CHINA PROPER

Pechili or Chili is the north-eastern province of China. It is naturally divided into two parts, that within and that beyond the Great Wall. The former portion is made up of the northern part of the great plain, and belongs mostly to the basin of the Pei-ho. Its western frontier lies beyond the plain, and is marked by another great wall running south along the mountains. It contains *Peking*, the capital of a kingdom as far back as 1100 B.C., and of the Chinese Empire as early as 1151 A.D., but not without intermission. It is entirely rectangular in shape, and is composed of two parts, a square to the north forming the Manchu city and enclosing the imperial quarters, and a more extensive oblong quadrangle to the south forming the Chinese city. It lies on a somewhat dreary alluvial sandy plain, swept in winter by cold dust-laden winds; but it has the advantage of a good site strategically, as

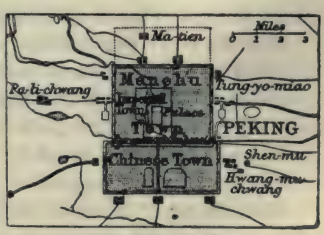

FIG. 270.—*Peking.*

it commands the roads leading north-west through the Nankow Pass, too narrow for carts, and thence into Mongolia through Kalgan or Changkiakou, north-east through the Kupei-kou Gate in the Great Wall to Chengte or Jehol which contains the summer-palace of the emperor, and eastwards along the base of the mountains to the narrow pass between sea and mountains at Shanhaikwan ("Mountain-sea-gate") which forms the entrance to Manchuria. Even more populous than Peking is *Tientsin(-fu)*[1] on the Pei-ho, the port of Peking, a treaty-port, and the northern terminus of the Grand Canal.

Shansi ("Western Mountains") is the province to the west of Pechili, and, like it, is divided into two portions by the Great Wall, but in this case both portions are alike mountainous, and for the most part sparsely peopled, the chief natural resources consisting in the mineral wealth above described. In the west this province has an unmistakable natural boundary in the profound gorge of the Hwang-ho, and the same river forms part of the boundary on the south-west. An important feature of the province is a line of narrow valleys running from north to south through the middle, in the central and largest expansion of which stands *Taiyuen(-fu)*, the capital of the province.

The province of **Shensi** adjoins Shansi on the west. Its most populous area is the valley of the Wei, but though this valley has such a marked physical barrier on the south, the province includes also the valley of the upper Han beyond that barrier, extending as far as the mountains bordering the Red Basin. In the Wei valley stands the capital of the province, *Singan(-fu)*, the site of which makes it of necessity a great centre on account of commanding the main through routes from north-west to the east and south-east. When the main lines of railway are all made in China they must include lines along all the existing routes, the north-western line forming the only possible connection between central China and western Siberia, so that Singan is bound to be reinvigorated. The inhabitants show a business capacity and enterprise answering to the advantages of the situation, and own many of the most important industrial establishments in distant parts of China.

Kansu is a mountainous province with deep valleys and loess gorges reaching in the north-west just to the end of the Great Wall. Its capital, *Lanchou(-fu)*, stands on the great north-western road, on the right or south bank of the Hwang-ho, close to the point where that river begins its great northern bend. It is noted for its tobacco factories, most of which belong to the capitalists of Singan.

Shantung ("Eastern Mountains") includes, beside the mountainous peninsula to which it owes its name, a belt of populous plain swathing the mountains round on the west. The capital is *Tsinan(-fu)* at the north-western margin of the hill country, a short distance from the Hwang-ho.

[1] The termination in parenthesis (*-fu*, *-hien*) merely indicates the status of the town, and is often omitted.

The mountainous part has a much indented coast-line. On one of the northern bays is the small treaty-port of *Chifu(-hien)*, another further east now forms the British naval station of Weihaiwei (acquired in 1898). On the south the chief inlet, Kiau-chou Bay, was leased to Germany in 1897.

Honan in the east occupies all of the great plain south of Pechili, and in the west it consists of mainly mountainous country. It is traversed in the north by the Hwang-ho, and south of that river by the numerous head-streams of the Hwai and its tributaries. The capital is *Kaifeng(-fu)* in the plain, on the great road from Peking to Hankow, about eight miles south of the Hwang-ho. In the west *Honan(-fu)* stands in a fertile valley amidst the mountains just south of the Hwang-ho.

Kiangsu includes all the low flat seaboard studded with large and small lakes extending from the north-eastern shore of Hangchou Bay to Shantung. It is thus divided into two parts by the wide estuary of the Yangtse, the smaller southern portion, which includes the last spurs of the Nan-shan, being by much the richer and more populous. In this portion is the busiest of all the treaty-ports, *Shanghai(-hien)*, the great *entrepôt* for all northern China. It is, in fact, the outlet of the whole Yangtse valley, though not situated on the river itself, whose low and silted shores afford no site for a great port, but twelve miles up the Wusung river, the one drawback to which is a bar at the mouth with a depth at high water of ordinary spring tides of only 23½ feet and 20 feet at neap tides. Here is the chief Chinese arsenal. In the same part are the great silk-manufacturing towns of *Suchou (-fu)* on the Grand Canal, and *Nanking(-fu)*, the latter on the Yangtse, at the west end of a chain of hills stretching from the Grand Canal, the capital of the province, and for about a century before 1421 the capital of the empire. It was once a magnificent city celebrated for its porcelain tower, which was destroyed by the Taiping rebels who held the town from 1853 to 1864. It contains another Chinese arsenal.

Nganhwei is the province to the west on both banks of the Yangtse, traversed in the north also by the navigable portion of the Hwai. Its capital is *Nganking(-fu)*, on the left bank of the Yangtse, 100 miles directly south-west of Nanking; its treaty-port is *Wuhu(-hien)*, on the right bank of the river, about forty miles from the same city.

Kiangsi, south-west of the previous province, is almost identical with the drainage area of the Poyang Lake. It is a great tea-producing district. Its capital is *Nanchang(-fu)* on the Kan-kiang, not far from the south shore of the lake at its summer level. North-east of the lake is *Kingtechen(-hien)*, the principal place of manufacture of earthenware in China, and the seat of the imperial porcelain factory. Its treaty-port is *Kiukiang(-fu)* on the Yangtse.

Hunan is a similar province to the west, corresponding [illegible]ly with the drainage area of the Tungting Lake. Its capital is *Changsha(-fu)* on the Siang, thirty miles south of the lake. *Siangtan*, on the same river, is reported to be one of the largest cities in China, and is a great centre of the drug

trade. *Yochou*(*-fu*) at the outlet of the Tungting Lake, not far from the Yangtse, is a treaty-port opened in 1898.

Hupe, to the north of both the last mentioned provinces, comprises the whole of the plain of the middle Yangtse, except what belongs to the basin of the Tungting Lake, along with a mountainous region to the west. The capital is *Wuchang*(*-fu*), a treaty port at the north end of a range of hills on the right bank of the Yangtse near the north end of one of the chief bends of that river, directly opposite the confluence of the Han. It is one of three towns enjoying the advantages of the same commercial situation, the other two being *Hanyang*(*-fu*), at the mouth of the Han on the right bank, and the treaty-port *Hankow*(*-hien*) opposite the latter on the left bank, all of which are at the meeting-place of great waterways from the south-east (up the Yangtse), south-west (down the Yangtse), west, and north-west. This situation gives these towns, whose aggregate population is not less than 1,200,000 (according to some estimates more than twice as much), commercial importance not only for the adjacent country but also for more distant provinces, and they have the greatest river traffic of any place in China, probably in the world. *Shasi* or *Shashi*(*-hien*), a treaty-port on the Yangtse, higher up, at the west end of a waterway connecting that river with the Han, is the chief market for cottons in central China, and *Ichang*(*-fu*) is a treaty port at the lower end of the Yangtse gorges.

Sechwan extends westward from Hupe to the frontier of China, and includes nearly all the Red Basin, together with a mountainous region to the west extending beyond the Yangtse (here called the Kinsha-kiang or River of Golden Sand), the borders being sparsely peopled and inhabited by a non-Chinese (Tibetan) population. Its capital is *Chengtu*(*-fu*) situated near the margin of the Red Basin in a rich alluvial plain about 2,400 square miles in extent, irrigated in every part by works constructed about 200 B.C., and ever since carefully maintained. The chief river port of the province is *Chungking*(*-fu*) now a treaty-port, situated at the confluence of the Kialing-kiang or Siao-ho (Little River) with the Yangtse, the one outlet eastwards of the trade of the province. It was reached by a British steamer, the first to ascend the rapids of the Yangtse, in March, 1898. To the south-west of the alluvial plain of *Chengtu*(*-fu*) is *Yachou*(*-fu*) a great centre of the trade in brick-tea with Tibet and central Asia, but most of the factories belong to capitalists of Singan. The province of Sechwan includes the chief towns of the elevated, and in its first stages very difficult, trade route leading westwards to Lhasa.

Kweichou is the mountainous province to the south-east of Sechwan, containing headstreams of rivers draining to the Yangtse and to the Si-kiang. Its capital is *Kweiyang*(*-fu*) on a small central plain.

Yunnan comprises nearly all the rugged elevated region, rich only in minerals, in the south-west of China, together with marginal portions of the surrounding valleys. Its two chief towns lie on the shores of its two chief lakes; its capital *Yunnan*(*-fu*), at the north end of a lake near the

middle, centralises the trade of the province with Tongking; the second town, *Tali(-fu)*, is important for the trade with Burma, and stands on the west side of the lake called Erh-hai, in the west of the province. In the south is *Sumao*, the centre of trade in Puerh tea, which enjoys the highest reputation throughout China.

East of Yunnan are two provinces comprising most of the basin of the Si-kiang, **Kwangsi** and **Kwangtung** ("the western" and "the eastern Kwang"). Kwangsi is mainly a rugged, poor and sparsely peopled province, whereas Kwangtung has always been one of the richest parts of the empire, containing as it does the largest and most densely peopled tropical delta east of the Ganges. It is this delta which has always given importance to Canton, the great southern seaport of China, for the sake of the trade with which the Portuguese sought and obtained possession of Macao in 1586 and the British of Hongkong in 1842. *Canton*, in Chinese *Kwangchou(-fu)*, Canton being a Portuguese corruption, is a town most happily situated at the west end of a series of hills, where the Canton or Pearl river affords a channel to the south for ocean vessels, the Si-kiang forms a waterway to the west for steamers drawing seven or eight feet as high as the treaty-port of *Wuchou(-fu)* in the adjoining province, the Tung-kiang, or East River, forms a navigable channel to the east, and the Pei-ho, or North River, leads to the northern confines of the province, and there by a fortunate arrangement of the physical features forks into two waterways, one leading north-west so as to communicate by a low water-parting and short portage with the main waterway of Hunan, the other north-east so as to communicate similarly with that of Kiangsi. About 300,000 of the inhabitants of Canton live in boats moored in the river.

Fokien, or Fukien, is a rich tea-growing maritime province with a much indented coast line to the north-east of Kwantung, having as its capital the ancient city of *Fuchou(-fu)*, a treaty-port at the mouth of the Min. There is another treaty-port, *Amoy*, in the south-east, and a third, *Funing(-fu)*, opened in 1898, in the north-east.

Chekiang is a similar province further to the north-east, extending to Hangchou Bay, of which it embraces both sides at the northern end. Its northern part is drained by the Tsientang-kiang, remarkable for the violence of its tidal bore. It has three treaty-ports, *Hangchou(-fu)*, the capital of the province, at the head of the bay, *Ningpo(-fu)* on a creek on the south side of the bay, and *Wenchou(-fu)* in the south-east of the province.

Statistics of China.—The censuses that have been taken of China are too untrustworthy, and the estimates of population too uncertain for any comparison of estimates at different dates to serve any useful purpose. The utmost that can be said is that it is not improbable that the total population of China Proper may amount to as much as 350 million or even more. Neither can statistical returns of the value of the external commerce

be drawn up so as to allow of a comparison of different periods, for the returns collected by the Imperial Maritime Customs now always include those for native junks, but these are not obtainable before 1887.

STATISTICS OF CHINA PROPER.

(*Approximate for* 1891–95.)

Area in square miles	1,300,000
Population	350,000,000
Density of population per square mile	270

PROBABLE POPULATIONS OF SOME IMPORTANT TOWNS.

Canton	1,600,000	Peking	500,000	Kaifeng	200,000
Hankow	1,500,000	Shasi	500,000	Tsinan	200,000
Tientsin	1,000,000	Suchou	500,000	Wuchou	200,000
Siangtan	1,000,000	Wuchang	450,000	Chinkiang	140,000
Chengtu	800,000	Shanghai	350,000	Nanking	130,000
Singan	700,000	Changsha	300,000	Chifu	120,000
Fuchou	650,000	Chungking	250,000	Amoy	100,000
Hangchou	500,000	Ningpo	250,000	Wenchou	80,000
Lanchou	500,000	Taiyuen	250,000		

ANNUAL TRADE (*in dollars, for* 1891–95).

Imports	146,000,000
Exports	149,000,000

II.—EUROPEAN POSSESSIONS IN CHINA

Hongkong.[1]—Hongkong (Hang-kiang, "fragrant streams") is one of the small islands off the Chinese coast, east of the mouth of the Canton River, nearly in the position of 22° N. and 114° E., and only separated from the mainland by a channel half a mile wide. The island was acquired as a British colony in 1841, and in 1861 the southern portion of the Kaulun (Kowloon) Peninsula, on the opposite mainland, was added. In 1898, the whole of the large peninsula forming the southern part of Kwangtung province was leased from China so as to secure the defences.

FIG. 271.—*Hongkong and Kaulun.* (*The map includes 48 miles by 37.*)

Surface and Resources of Hongkong.—The northern coast with the opposite mainland encloses one of the finest harbours in the world, covering an area of about 10 square miles, and on this the prosperity of the colony entirely depends. The island is composed of igneous rocks, granite and basalts. It is traversed east and west by hill ridges, intersected by

[1] By the Editor, assisted by E. J. Hastings.

depressions or "gaps," and rising in Victoria Peak, the highest point, to 1,825 feet. The only product of importance is granite, which is extensively quarried. Forests which formerly covered the island have been completely destroyed, but a system of reafforesting is being successfully carried out. The climate is hot, but subject to great variations, the mean monthly temperature ranging between 40° and 90° F. During the winter months, November to March, the air is pleasant and bracing. The average rainfall is about 90 inches. Hongkong has outlived its old, evil reputation as an exceedingly unhealthy place.

People and Government of Hongkong.—The native population consists chiefly of Chinese, about one-third of whom are British subjects by birth. Natives of India form a small proportion. Besides the members of the British naval and military establishments, there are representatives of various nationalities, as Hongkong is the greatest traffic centre on the Chinese coast. The government is that of a Crown Colony, the Governor being assisted by a nominated Legislative Council. The city of Kaulun in the leased territory is exempt from direct British jurisdiction. Hongkong is a very important strategic point, commanding the approach to Canton, 90 miles distant. It is strongly fortified, and is the headquarters of the British naval squadron in Chinese waters. It is also a great commercial emporium, an absolutely free port without any Custom House, and is the principal distributing centre for European products in the Far East. The United Kingdom has the largest share in the trade, which is really part of the trade of China. The chief imports from Europe are cotton goods, and the chief exports tea, silk, and hemp from China.

FIG. 272. — *Badge of the Colony of Hongkong.*

Victoria, the capital, stretches along the north shore of the island for about four miles, and rises in terraces up the sides of Victoria Peak, some of the garden-enclosed residences being as high as 600 feet. The town contains several fine public buildings. The Praya, or main street, runs along the shore, and for about two miles of its central part is protected by the Praya sea-wall, specially constructed to withstand the force of the typhoons which sometimes sweep along the coast, and provided with wharfage for the ocean liners and other vessels calling at the port. Six docks and large workshops afford every requirement for the repair of large naval and mercantile ships. The movement of the port, excluding native junks, is over 14,000,000 tons of shipping entered and cleared annually, a figure only equalled by two or three seaports in the world.

STATISTICS.

	1881.	1891.	1901.
Area of Hongkong (square miles)	30	30	30
Population of Hongkong	160,402	221,441	283,975
Density of population per square mile ..	5,346	7,381	9,466
Area of leased territory in Kwangtung ..	—	—	376
Population of leased territory	—	—	100,000

Macao.[1]—Macao, the only Portuguese possession in China, practically consists of the city of that name, on an island at the mouth of the Canton river. It may be called a commercial colony of average prosperity. The islands of Taipa and Coloane, important fishing centres, are under the same administration. Macao is a healthy town with fine streets and buildings. The mean temperature is 73° F. It has belonged to Portugal since 1586, and is by far the oldest of the European possessions in China. The population of the town, which is a centre of the opium trade, is 78,000.

Kiau-chou.[2]—Kiau-chou, in lat. 36° S., 120° E. long., is a large bay of 180 square miles area on the southern coast of the peninsula of Shantung. It takes its name from the "Glue city," 22 miles north of it. The Kiau river coming from the mountains in the eastern portion of Shantung brings down much sand, which causes the bay to silt up. The entrance of the bay, between two narrow spits of land, is about two miles wide and 20 fathoms deep. The landspits, together with the islands in the bay, are leased by Germany from China, while the German sphere of interest extends all round the bay for a distance of 31 miles (50 kilometres). The climate is excellent, and quite that of the temperate zone; ice occurs in winter, but as it hardly ever covers the bay it does not form such an impediment to navigation as the fogs which are frequent on the coast further south, from which Kiau-chou is perfectly free. The greatest rainfall occurs in July and August. The inhabitants are agriculturists who have carried a system of irrigation to great perfection. The tidiness of their settlements is a mark of their prosperity. Kiau-chou is expected to prove valuable as an outlet for the great mineral wealth of Shantung, and the railway intended to run round the base of the western mountains of Shantung is now completed from *Tsingtau* to beyond *Wei(-hien)*.

FIG. 273.—*Kiau-chou Bay.*

III.—REMOTE PROVINCES OF THE CHINESE EMPIRE

Manchuria.—Manchuria lies to the north-east of China Proper, and is made up of three provinces, Shengking in the south, Kirin in the middle, and Helungkiang in the north. Shengking consists of the broad valley of the lower Liau stretching upwards of 200 miles north-eastwards between bare mountains in the west and forest-clad mountains with fertile alluvial valleys in the east. The southern portion of the main valley is a dreary saline tract, but there is more fertile country further north. *Mukden*, situated at the base of the hills, on a tributary of the Liau-ho, is the capital of the province and country. At the mouth of the Liau is the so-called treaty-port of *Niuchwang* (*Newchwang*), the town of Niuchwang being situated somewhat inland. The extremity of the mountainous peninsula of Liautung

[1] By Captain Ernesto de Vasconcellos. [2] By Graf von Pfeil.

("East of the Liau"), called Kwantung, was leased to Russia; here are the naval station and arsenal of *Port Arthur*, together with *Talienwan* and the free-port *Dalni*, all three being termini of the trans-Manchurian railway (see Fig. 222), and now in the occupation of Japan.

The northern provinces lying to the east of the Khingan mountains are composed of the rich valleys of the Sungari, Nonni (a left bank tributary of the Sungari) and Usuri, all navigable streams. The chief towns are *Kirin* (or more properly Girin[1]) at the head of navigation on the Sungari, and *Tsitsihar* at that of the Nonni. The population of Manchuria is variously estimated at from 15 to 23 millions, the great bulk being in the southern province. For many years there has been a steady stream of immigration from China Proper, and Chinese now form the great mass of the population of the provinces. In recent years the flow of immigrants into the northern provinces has been peculiarly rapid. Russian influence is now paramount, and is being made permanent by the railways (p. 419).

Mongolia.—Mongolia is the vast region surrounding the desert of Gobi or Shamo, the latter term being Chinese, and signifying Sea of Sand, though the region is for the most part sufficiently moistened by summer rains to produce a fair amount of pasture and fodder-shrubs for sheep, horses and camels. The altitude of the Gobi is from 3,000 to 3,300 feet. The fixed settlements of Mongolia are chiefly in the north, where it is traversed by extensive spurs from the Altai, Tian Shan, Sayan, and Yablonovyi mountains. The chief trade routes are from Kalgan in Pechili and Kweihwacheng in northern Shansi, northwards by *Urga* to *Maimachin* on the right bank of the Amur opposite Kyakhta, and north-westwards by *Uliasutai* and *Kobdo* to western Siberia. The inhabitants, from whom the region takes its name, are mainly Buddhists in religion, and are now a peaceable race engaged chiefly in the rearing of sheep, camels, horses and other animals, and having none of the qualities which rendered their ancestors so formidable throughout Asia and Europe in the thirteenth century under Jenghiz Khan and his successors.

Eastern Turkestan.—Sinkiang, or Sintsiang, is the name now given to the province comprising all the rest of Chinese Central Asia north of Tibet. It is naturally divided into two sections by the Tian Shan range, Kashgaria, by much the larger, to the south, and Dzungaria to the north. In Kashgaria the population is for the most part settled in irrigated oases on the banks of rivers at the base of the Kwen-lun and Altyn Tagh, the Pamirs and the Tian Shan; but in the east there is another series of oases between 94° and 96° E. due to the existence of wells stretching from Ngansichou, or Ansifan, in the south to *Hami* in the north. This chain of watering places forms the shortest route across the dreary waste of sand, and is the direct continuation of the great north-western highroad of China. Westward the route is continued either south of the Tian Shan by the oases

[1] Manchurian, *Girin*; Chinese, *Kilin*; Kirin is neither.

of Turfan, Karashahr, and Kuchar to Kashgar (the Tien-shan-nan-lu or Tian Shan south road), or north of the Tian-shan by *Barkul* and *Urumtsi* (or Urumchi) to Kulja in the fertile valley of the Ili. There is now no regular trade route south of the desert in Kashgaria, but among the important oases here are Yarkand, Khotan, Keria and Cherchen in the order given from west to east.

The greater part of Kashgaria may be described as belonging to the basin of the Tarim, though many of the streams which give life to the oases dry up before reaching the main river. The Tarim flows along the north of the desert, and then curving south finally makes an abrupt turn to the east and terminates in the lake known as Lob (or Lop) Nor, at an altitude of about 2,200 feet. Although without outlet this lake contains fresh water, a circumstance which can only be explained, as Dr. Sven Hedin points out, by the fact of its very recent formation, the lake beds being frequently filled up by desert-sand, and forming afresh in a new place. In its neighbourhood the wild horse and wild camel were found by the great Russian explorer Przhevalski, but it is questionable whether these may not be descended from domestic animals escaped long ago from servitude. The wild ass which roams in great herds on the bordering mountains to the south is undoubtedly native ; it is a fleet and graceful creature, larger than the common donkey. The interior of the Tarim basin is a continuous succession of sand dunes slowly moving westwards. In their progress they have in the course of ages overwhelmed ancient cities, the ruins of which yield interesting relics of a long-forgotten civilisation. Two of these cities were recently found by Dr. Sven Hedin between the rivers Khotan and Keria ; and the latter stream was found to reach at high water much further north than is represented on maps.

Kashgar, on the Kashgar river, one of the two chief headstreams of the Tarim, is the administrative capital and the chief centre of trade with Russian Turkestan (across the Terek-davan and Terekti passes). *Yarkand,* on the Yarkand-daria or Zerafshan, the second of the two chief headstreams of the Tarim, is the chief centre of trade with Kashmir (across the Karakoram Pass), and is the rival of Kashgar in wealth and population. In the gorge of the Pamirs through which the upper waters of this river flow is the place from which all the jade (nephrite) introduced into China was formerly obtained. *Khotan* is another populous oasis, and in the sixth and seventh centuries was the seat of a powerful kingdom. The total population of Sinkiang, consisting mainly of Mohammedans of Turki race and speech, is about 1,000,000 or 1,500,000. Both in Mongolia and Sinkiang the government is mainly carried on through native rulers (Ambans) under the control of Chinese mandarins, and the principal centres are garrisoned by Chinese troops to guard against the revival of a native kingdom like that of Yakub-beg, who ruled Turkestan from 1869 to 1876.

Tibet.—The great plateau of Tibet, the most elevated region in the world, stretches through about 12° of latitude (28° to 40°) between the

Himalayas and the Kwen-lun, Altyn Tagh, and Nan-shan, and through 24° of longitude (79° to 103° E.). It consists of extensive mountain-traversed high plains with an elevation of 14,000 to 17,000 feet in the west, and from 9,000 to 14,000 feet in the north-east; while in the east and south-east the intricate system of ranges and gorges containing the headstreams of the Me Kong, the Yangtse, and the Hwang-ho form the border towards China. Numerous large lakes are scattered over the surface. Among them are Kuku-nor in the extreme north-east, Charing and Oring-nor on the headstream of the Hwang-ho, Tengri-nor to the north and Palti or Yamdok-tso to the south of Lhasa, and the two Manasarowar lakes in the extreme south-west, the western of which is the source of the Indus. The climate is necessarily bleak and inclement on account of the great altitude. Frightful snow-storms occur in winter, and agriculture of any kind is only possible in the most sheltered valleys. The great bulk of the inhabitants live in the valley of the Tsanpo or Brahmaputra on the south, and in the valleys immediately adjoining, where barley, wheat and peas are grown, although pastoral pursuits are the chief occupation of the country. The yak (a peculiar kind of ox), the sheep, and the goat all occur both wild and domesticated, and all three, besides horses and mules, are made use of as beasts of burden. The people are of Mongolic stock, speak a peculiar language, are Buddhists (Lamaists) in religion, and are extremely exclusive. The idea of "making merit" by repeating prayers, or offering them mechanically by prayer-wheels turned in the hand or actuated by wind or water-power, possesses the Tibetan mind to the exclusion of all enterprise or independent thought.

Even the Chinese control appears to be slight. The governing classes live in monasteries, which are said to contain a third of the population, and thus form a terrible burden on the rest of the inhabitants. Though there are Chinese resident officials, the government appears to be practically exercised wholly in the name of the Dalai-Lama, who resides at Lhasa, in one of the northern valleys tributary to the Brahmaputra, and that of the Teshu-Lama who lives further west just south of the Brahmaputra. *Lhasa*, which is considered the capital of the whole country, had been entered by only three Europeans,—Mr. Manning in 1811–12, and MM. Huc and Gabet in 1845–46,—until it was temporarily occupied by a British force coming from India in 1904. It is a holy city, and a great centre of Buddhist pilgrims. A large trade with India might probably be maintained across the Himalayan passes by exporting wool, borax, perhaps gold and other mineral products, in exchange for tea and manufactured goods, but this trade is greatly restricted by customs duties and other obstacles, in consequence of which brick-tea of wretched quality is imported by a most difficult route from China. Not till 1894 were British subjects allowed to reside in any part of Thibet, but in that year residence was allowed at Yatong or Yatung, near the frontier of Sikkim.

TABLE OF PROVINCES OF THE CHINESE EMPIRE.

	Area in square miles.
Pechili (within the wall)	57,916
Pechili (without the wall)	57,916
Shansi (within the wall)	66,410
Shansi (without the wall)	15,444
Shensi	75,291
Kansu	125,483
Shantung	55,985
Honan	67,955
Kiang-su	38,610
Nganhwei	54,826
Hupe	71,430
Kiangsi	69,499
Hunan	83,398
Chekiang	36,681
Fokien	46,332

	Area in square miles.
Kwangtung	86,873
Hainan	13,166
Kwangsi	77,220
Kweichou	67,182
Yünnan	146,719
Sechwan	154,440
Total (China Proper, round numbers)	1,533,000
Manchuria	364,000
Mongolia	1,093,000
Sinkiang	550,000
Tibet	738,000
Grand Total, Chinese Empire (round numbers) ..	4,278,000

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KOREA

By Mrs. Bishop, F.R.G.S.

Name.—Korea, or Korai, is known locally as Ch'ao-sien (*Fresh morning*), but the name was changed officially in 1897 to Dai Han (*Great Han*).

Position and Extent.—Korea is a definite peninsula of north-eastern Asia, lying between 34° and 43° N., and between 124° and 131° E. Its coast-line is roughly estimated at 1,740 miles, its length at 600, and its extreme breadth at 135. Its eastern coast is steep and rocky, with deep water, few but excellent harbours, never ice-locked, and an insignificant tidal rise and fall. The western shores are mostly shelving and oft-times low, cut up by muddy estuaries, and fringing off into a remarkable archipelago with dangerous tideways, and the tidal rise and fall is from 20 to 38 feet. There is no lighthouse system. Many of the adjacent islands are fertile and inhabited, and Quelpart, on which is the volcanic cone of Hal-la-san (6,000 feet), has a large population, and breeds ponies to a considerable extent. The Tumen and Yalu rivers form the natural boundaries between Korea and Russia and Manchuria.

Surface.—The general aspect of Korea is hilly. In the north there are several mountain groups with definite centres, Paik-u-san (8,000 feet), in which both the boundary rivers rise, being the most important. A range running southwards from this centre divides Korea into two unequal sections, the eastern being a narrow and fertile strip between the mountains and the Sea of Japan, while the western consists of innumerable rich and well watered valleys and slopes, lying among the lateral spurs which the range throws off. The Korean mountains present striking examples of denudation. The great axial range, forest-covered in the north and for 40 miles of its passage through the Kang-wön province, is usually bare like the coasts, or is covered with oak and chestnut scrub. Towards the southern coast it falls away into rocky hills and frequently into infertile plains. The lakes are few and insignificant, and the plains are of very limited extent. Mesozoic rocks occur, but granite and metamorphic rocks predominate. North-east of Seoul are very extensive lava beds, and lava and volcanic rock occur frequently in the north. The Han and Tai-dong flow frequently through limestone formation. The rivers are numerous, shallow, and impetuous, and navigable only for a short distance from the sea. The exceptions are the Yalu, Nak-tong, Mok-po, Tai-dong, and Han, which last, rising thirty miles from the Sea of Japan, after cutting Korea nearly in half reaches the sea on the west coast near Chemulpo, the port of Seoul and the terminus of the Seoul railroad, and in spite of many and severe rapids is an important highway of trade for about 160 miles.

Resources and Climate.—The soil is rich, eminently fitted for successful agriculture, and yields from two to four crops annually. The rainfall is ample and reliable, and irrigation is only necessary for the rice crop. All cereals and root crops, as well as tobacco, cotton and hemp, flourish. The mineral wealth consists in rich but undeveloped iron and coal mines, silver, galena, copper, and gold, which though exported in considerable quantities is obtained only by a rude form of washing. For more than nine months of the year the climate is superb. The rainy season is hot and damp, but the heat is tempered by the sea breezes, and Europeans and their children are exempt from diseases of locality. The average rainfall at the capital is about 36 inches. The summers are hotter and the winters colder than those of central Japan.

People and History.—The Koreans are undoubtedly of the Tungusic stock. Their features are decidedly Mongolian. Their language differs widely from Chinese and Japanese. It is polysyllabic and possesses an alphabet. The Koreans are physically a fine people, and mentally are liberally endowed. The earliest notice of the country is in a book, "Roads and Bridges," by an Arab geographer, Khordadbeh, in the ninth century A.D. Oral tradition, fairly worthy of credit, asserts that Korea was inhabited by the same race as at present when the Chinese General Kit-ze, after considerable conquests, introduced Chinese civilisation in the twelfth century

B.C. After many subsequent vicissitudes, the kingdoms of which Korea is composed were united under one monarch, and became tributary to China until the war of 1894; after the Russo-Japanese war in 1905 Korea came under the protection of Japan. The government is a hereditary and absolute monarchy of a strictly Oriental type, the Imperial Edicts constituting law. There is a standing army of 6,000 men, clothed, drilled, and armed in European fashion. The chief sources of revenue are the land tax and Customs duties. Korea is solvent. The Empire contains 14 provinces and 340 prefectural districts. Goods are carried by land on the backs of men, ponies and bulls. The roads are everywhere bad. A railroad from Chemulpo to Seoul is being extended to Songdo and to Suwön.

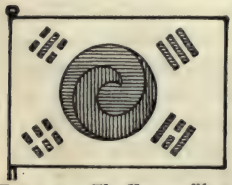

FIG. 274.—*The Korean Flag.*

Korea has regular communication with Japan, Russia, and China, chiefly by Japanese steamers.

Industries, Trade, Religion, Education.—Apart from agriculture, which claims three-fourths of the population, the chief industries are the manufacture of cotton and grass cloth, thin silks, horse-hair gauze, salt, and iron and brass utensils, all for native use. Rice, beans, hides, and ginseng are exported. Cotton piece goods and cotton yarn are the chief imports. Buddhism, introduced from China at an early period, has been discredited for three centuries. The officials observe the Confucian rites. The real cult of the people is Dæmonism. Christianity is making rapid progress. Education, though with some recent modifications, is on the Chinese system, and consists in acquiring the Chinese ideographs and classics. The pure Korean language and script are used almost solely by the lower classes. The arts are *nil.* Korea has an efficient postal and telegraph system. The country was closed to Europeans until 1882; but there are now ten open ports and a resident foreign population of about 22,000, over 16,000 being Japanese. Korean history since the war with China of 1894 has been made up of reforms and retrograde movements. Trade has increased rapidly. The east and south coast fisheries are prolific, but are worked chiefly by Japanese. The fauna of Korea is headed by tigers and leopards. The country is rich in native and migratory birds. The economic plants are few, ginseng being the most important. *Seoul*, the capital, is the centre of government and of all public interests. It is nearly without antiquities.

STATISTICS (*Estimates*).

Estimated area of Korea (square miles)	82,000
Population of Korea by first census, 1897	17,000,000
Christian population in 1898	39,000
Population of Seoul, 1897	219,815
Total Exports from Korean open ports (1896–1900)	£700,000
Total Foreign Imports at Korean open ports (1896–1900)	£1,000,000

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CHAPTER XXIX.—JAPAN

By W. B. Mason,
Tokyo.

Position and Extent.—The Japanese call their country *Nihon* (in another form, Nippon) or *Dai Nippon*, which means "Great Japan," the Land of the Rising Sun. The chief islands which constitute Japan proper are Honshu, the central and largest (often erroneously called Nippon), Shikoku, Kyushu, and Yezo, separated from each other by narrow straits. The most important islands in close proximity to them are Sado, Tsushima, Oki, and Iki, in the Sea of Japan; the Goto group, and Amakusa, in the Tunghai, Awaji, in the Inland Sea; Tanegashima, and Yakunoshima, in the Pacific. The Japanese possessions also include the Luchu group (*Ryukyu*), lying to the south-west of Kyushu; Formosa (*Taiwan*), and the Pescadores (*Ho-ko-to*), ceded to Japan after the war with China in 1894–5; the southern half of Sakhalin acquired as a result of the war with Russia in 1905; the Kuriles (*Chishima*), extending in a north-westerly direction from Yezo to Kamchatka, and a vast number of small islands, no less than 487 in all being considered worthy of administrative recognition. The Bonin Islands (*Ogasawara-jima*), a small and unimportant group, lying far off in the southern seas in about 24° N. and 140° E., are also ruled by the Japanese. The main islands stretch along the east coast of the continent of Asia in the form of a crescent, the northern horn of which turns in towards Siberia, and the southern towards Korea. Between the two flows the Sea of Japan.

Surface.—The eastern shores of the archipelago are washed by the waters of the North Pacific Ocean, from whose immense depths rise range upon range of imposing mountain heights, often crowned by still more imposing volcanic cones. But the islands are not solely of volcanic origin. Many of the higher formations are giant masses of granite overlaid with igneous rocks. Earthquakes, seismic-waves, and an excessively humid climate have contributed, in no small degree, towards giving Japan its characteristic physical features. In the Main Island the central mountain range follows the trend of the land itself from north-east to south-west, while various smaller ranges run parallel with or branch out from it, often descending precipitously to the sea and forming bays and harbours capable of sheltering the largest ships. Almost all are luxuriantly wooded, and the numberless valleys winding amongst them are cultivated to the utmost limit. Solfataras and thermal springs of various kinds

FIG. 275.—*Japan.*

abound in every part of the country. The chief mountain peaks comprise the famous and beautiful Fuji-san (12,400 feet), a perfect cone rising from the plain, the Hida-Echu range, with Tateyama, Yari-ga-take, Ontake, and others, all about 10,000 feet above sea-level, and another similar lofty range running from north to south between the rivers Fujikawa and Tenryu-gawa. The active volcano of Asama-yama, in the province of Shinshu, attains a height of 8,280 feet. In Shikoku the main system slopes towards the Pacific on one side and towards the Inland Sea on the other. Kyushu is likewise very mountainous. It possesses two notable active volcanoes, Aso-san (5,630 feet), rising from the bed of an ancient crater, said to have the largest circumference of any in the world, and Kirishima-yama (5,530 feet). There are also some conspicuous volcanic cones in the island of Yezo. Fully three-fourths of the area of Japan are mountainous, and less than 16 per cent. under cultivation.

Rivers.—The rivers mostly partake of the character of torrents. They cut their way impetuously through deep rocky gorges and wooded ravines until they reach the lower land, where, owing to the detritus carried down from the heights, their beds often attain a width of several miles. They are rarely navigable for

any but the shallowest craft, being for the greater part of the year little more than fordable streams. It is only in late summer, after the close of a period of drought, that they assume dangerous proportions, the torrential rains causing them to rise from ten to fifteen feet above their normal height, and spread destruction for many miles around. Of the few rivers of any length, the most noteworthy are the Tone-gawa which, rising in the province of Kotsuke flows into the Pacific Ocean at Choshi, and has a remarkable system of lagoons near its mouth; the Shinano-gawa and the Kiso-gawa both rise in the province of Shinshu, the former reaching the Sea of Japan at Niigata, the latter the Pacific Ocean, near Nagoya; the Kitakami-gawa, after traversing the provinces of Rikuchu and Rikuzen from north to south, falls into the Bay of Sendai. The longest river in Yezo is the Ishikari-gawa, noted for its salmon. Lake Biwa, in the province of Omi, is the only large sheet of fresh water worthy of special mention. It is 36 miles long by 12 miles in width, its greatest depth about 300 feet; and its shores, which are classic ground to the Japanese, famous throughout the land for their beauty.

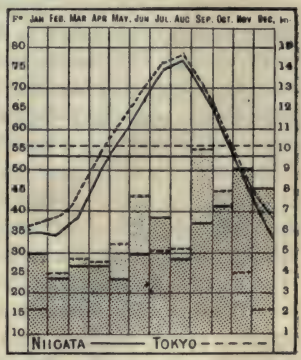

FIG. 276.—*Temperature and Rainfall Curves for Tokyo and Niigata.*

Climate.—Japan, at one extreme, lies within the tropics, and at the other, though just touching the latitude of the south of England, experiences the rigours of arctic cold. The climate of the chief islands is considerably influenced by their proximity to the mainland of Asia and to the *Kuroshiwo*, an ocean current like the Gulf Stream, which carries the heated waters of the equatorial seas along the east coast of the archipelago, while a branch of the same, entering the Sea of Japan through the Strait of Korea, strikes the north-west coast of the main island. The prevailing winds being southerly in summer and northerly in winter, the effect of these ocean currents is consequently greater upon the amount and distribution of precipitation than upon the temperature. Snow falls in every portion of the main islands, but, except on the west coast and the mountains, does not lie for any length of time. Yezo alone remains snow-bound for several months, and even the sea freezes on a part of its coast. The hottest period is usually from the middle of July to the middle of September. Japan has an abundant rainfall. The wet weather sets in early in April, and with occasional intermissions, lasts until the beginning of August. Again, in September, at the end of the summer heat, heavy rains, sometimes accompanied by typhoons, or revolving storms, cause immense damage to property. Thunderstorms are not frequent except in the mountainous districts. The driest months are November, December, and January, when a clear sky with high barometer prevails on the Pacific side

and dull, dense masses of cloud lie over the Sea of Japan. A cold, arctic current which sweeps past the Kuriles causes the east coast of Yezo and the north-east of the main island to be enveloped in fog for a large portion of the summer months. At Tokyo the mean temperature for twenty years (1876–95) shows an average of 57° F.; the absolute maximum temperature during the same period was 98° F., and the absolute minimum temperature 15° F. The mean yearly rainfall amounted to 58 inches.

Mineral Resources.—The chief mineral productions of Japan are gold, silver, copper, iron, antimony, and coal. The more precious metals occur in small quantities, and the ore is generally poor. Copper has always been, and still continues to be, the most abundant as well as the purest of Japanese metals, the mines of Ashio, near Nikko, being the largest in Asia. The output of antimony from the island of Shikoku reaches a high figure. The richest coal-fields are found in Kyushu and in Yezo. Very little stone is employed for building purposes.

Flora.—A climate ranging from the temperate to the tropical gives an extraordinary luxuriance to the Japanese flora. The bamboo and the sago-palm flourish even in the latitude of Tokyo. The pine, elm, chestnut, and oak are common, while the beech is found in the north and on the higher elevations. Amongst Japan's most picturesque trees is the *Cryptomeria japonica* (a kind of cedar) which borders the ancient highways and the approaches to celebrated shrines. It often attains gigantic dimensions, as does also the camphor laurel. The wax-tree (*Rhus succedanea*) supports an important branch of industry in Kyushu and the southern half of the main island. Other valuable trees are the paper-mulberry and the lacquer-tree. The cherry and plum are cultivated chiefly for their blossoms. Persimmons and oranges rank amongst the most characteristic of Japanese fruits, the apples, pears, peaches and figs which are grown being mostly of an inferior description. The tea-plant flourishes best in central Japan. A profusion of wild flowers carpets the moors in summer, while the maple and other deciduous trees make the hillsides glow with their changing colour in autumn. Rice, barley and millet are the staple cereals.

Fauna.—The fauna of Japan furnishes numerous types to prove the connection of the islands with the continents of Asia and America in remote geological times. Bears still roam in the wilds of Yezo, and with the wild boar, wild deer, and the monkey, are occasionally to be met with in the mountain fastnesses of the main island. The fox and the badger play an important part in folk-lore; but wild animals are far from numerous. Among the rodents may be named the squirrel and the hare, while the rat is everywhere a common plague. Domestic animals include the horse, cow, pig, dog and cat. Sheep have been imported, but do not thrive. Of the numerous species of birds only the lark and the *uguisu* (a species of nightingale) break the silence of the moors and valleys with song. Snakes, large and small, abound, but are mostly harmless. The Japanese seas teem with fish, the *tai* (a kind of bream), and the *maguro*, a large red-fleshed fish, calling for

special mention, as both are highly esteemed for food, and often eaten raw. Among fresh-water fish the salmon and the *masu* (*Salmo japonicus*) swarm in some of the northern rivers. The *ai*, a kind of trout, is common to all Japanese rivers. Insect life is abundant and varied; particularly beautiful in colour are the moths and butterflies. Mosquitoes and fleas infest all parts of the country.

People and Language.—The origin of the Japanese people is unknown, but learned opinion generally agrees in regarding them as the fusion of two or three different tides of Tataro-Mongolian immigration which flowed to Japan by way of the Korean peninsula. Before the advent of these settlers the land was inhabited by the Ainu aborigines, a hairy race, who, in their turn, must have come from the neighbouring continent. At the present day, having been gradually driven northwards by the more energetic race, and unable, like other aboriginal tribes, to exist under civilised conditions, they are only to be found, in ever-decreasing numbers, in the island of Yezo and the adjacent Kurile Islands. That much intermarriage ever took place between them and the smooth-faced invaders does not seem probable, although undoubted traces of the Ainu type exist, especially in the northern provinces. There may be also an admixture of the Malay, but the Mongol type largely predominates in the straight hair, pallid complexion, and the more delicate oval features which distinguish the better classes. Smallness of stature characterises the whole race. The Japanese are distinguished from other Oriental peoples by their love of cleanliness, their politeness, and the possession of a certain artistic instinct, and appreciation of natural beauty.

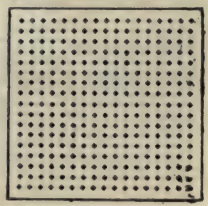

FIG. 277.—*Average population of a square mile of Japan.*

The Japanese language has certain structural affinities with the Altaic family, but no close resemblance to any known member of the stock. It is polysyllabic and has the verb after its object, features radically separating it from Chinese, which is a monosyllabic tongue, and which has the verb before its object. Other marked peculiarities of Japanese are that the tenses of the verb have no distinction of number or person; the nouns no inflexions to distinguish gender, number, or case, and that the prepositions follow the nouns they govern. The pronouns differ to mark the rank or grade of the person addressed or speaking, an "honorific" system which also modifies the verbal forms. A wide divergence exists between the spoken and written languages. Japanese may be written in two ways, either in the Chinese ideographs or in the native *kana* (of which there are two forms), a phonetic syllabary composed of forty-seven simplified characters, the former being chiefly used by the educated, the latter by the lower classes.

History.—Japanese official history dates from 660 B.C., but no records prior to the fifth century of our era are considered trustworthy. Claiming

descent from the gods who created the islands of Japan, the Mikados or Emperors held absolute and undisputed sway until the middle of the eleventh century, when their authority, passing into the hands of the dominant military families, became merely nominal—a state of affairs which inaugurated a dual system of government, and, only slightly changed in form, lasted down to our own day. The power thus attained by the sword had to be maintained by the sword. Continual internecine strife waged by the Daimyo, or feudal lords, characterised the Middle Ages. Not until the appearance in 1603 of the greatest of these military rulers, or *Shoguns*, as they were called, in the person of Tokugawa Jeyasu, did the country enjoy the blessings of peace. By his able administration and judicious distribution of political favours, he succeeded in firmly establishing the supremacy of his own house, who continued to rule the land in profound tranquillity for two hundred and fifty years. During this long period a restricted intercourse with Dutch merchants at Nagasaki, in the south-west corner of the empire, was Japan's only point of contact with the outer world; and it was the attempt of the United States in 1853 to break down this policy of isolation which led to the collapse of the Shogunate and the feudal system with it, the opening of the country to foreign commerce in 1868, and the restoration of the Mikado to that absolute sovereignty of which he had so long been deprived. The chief subsidiary events of Japanese history include the introduction of Buddhism from Korea in A.D. 552, soon followed by the Chinese system of administration, the invention of the native syllabary at the beginning of the ninth century, the repulse of the Mongol invaders under Kublai Khan (1274–1281), the arrival of the Portuguese and Spanish missionaries and subsequent persecution of the Christians in the sixteenth century, and the closing of the country against the outer world in A.D. 1624. The most important events since the signing of the treaties with foreign powers in 1859, have been the introduction of posts, telegraphs, and railways in 1871–72, the Satsuma Rebellion in 1874, under General Saigo—a futile effort to restore the old order of things—the proclamation of the Constitution on Western lines in 1889, and the successful war with China in 1894–95. New treaties have since been concluded with all the Great Powers, which enable Japan to enter the comity of nations on a footing of perfect equality—the first Asiatic State to receive that high privilege.

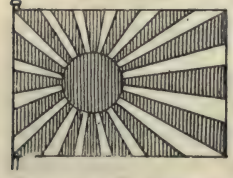

FIG. 278.—*The Japanese Flag.*

Government.—The authority of the Emperor remains paramount and unquestioned in all matters of government. The Diet, established under the Constitution of 1889, is composed of two Houses, an Upper and a Lower. The members of the former are selected from among the hereditary nobility, and others are chosen by the Emperor for conspicuous

merit in civil or military life ; the members of the latter are elected by the suffrages of a limited portion of the people. The Cabinet consists of nine Ministers of State appointed by the Emperor, to whom they are alone responsible ; but all laws must receive the sanction of both Houses before passing. The departments over which they preside comprise Foreign Affairs, the Army, the Navy, Home Affairs, Finance, Justice, Education, Agriculture and Commerce, and Communications. There is also a department of the Imperial Household, but its chief has no seat in the Cabinet. Provincial assemblies were established in 1889.

Trade and Communications.—Japan is no longer a State depending solely, as she did for centuries, on her agricultural resources ; but in manufactures and industries has already taken a considerable place amongst the nations of the world. The remarkable expansion of her commerce may be seen in the figures of the appended tables. Silk is the chief staple of export, the best qualities coming from the provinces of Shinshu, Kotsuke, and Koshu. Numerous filatures are now worked by imported machinery. Tea ranks next in importance. It finds its principal markets in Canada and the United States, where it is used for mixing with other varieties. In the cotton spinning industry the development has been extraordinarily rapid. During 1896, raw cotton to the extent of 206,000,000 lbs. was consumed, of which quantity only 1,350,000 lbs. were of Japanese production. Other important articles of export include rice, coal, straw-braid, matting, matches, fish-oil, and copper. Japan has long enjoyed a high reputation for her achievements in the mechanical arts, notably in metallurgy and the manufac-

e of porcelain and lacquer-ware. The United Kingdom and dependencies share to the extent of nearly one half in the total foreign trade. Numerous steamship companies provide for an extensive coasting trade. The largest of these also runs vessels regularly to China, India, Europe, and America. The native junk with its huge square sail still forms a picturesque feature, both on the coast and larger rivers. The first line of railway, 18 miles in length, connecting Yokohama with the capital, was opened in 1872 ; and in 1900 a well-equipped system existed of over 3,700 miles, with many new lines in course of construction. The trunk line of railway joins Aomori, in the extreme north of the main island, with Kagoshima, in the south of Kyushu. Two branches cross the country from east to west, one from Tokyo to Niigata, the other from Kyoto to Kanazawa, while a network of lesser lines is rapidly spreading over the large plain in which the capital lies. In districts still unprovided with railway communication, the *jinrikisha* remains the chief mode of conveyance. An admirable post and telegraph system, together with telephone exchanges in all the larger towns, adds to the convenience of internal communications.

Political Divisions and Towns.—Before the revolution of 1868 Japan was divided into nine Circuits (*Do*) which were subdivided into seventy-one provinces (*Kuni*). These ancient divisions still remain in popular parlance, but for administrative convenience and political con-

siderations, they have been replaced, without regard to physical or historical frontiers, by a classification into three City Governments (*Fu*), which comprise Tokyo, Kyoto and Osaka, and forty-three Prefectures (*Ken*). Yezo, under the denomination of *Hokkaido* and Formosa, possess separate administrations. All the larger towns, with the exception of Kyoto, may be said to derive their prosperity from the comparatively wide and fertile plains in which they are situated.

Tokyo, formerly known as *Yedo*, only became the capital when the Emperor removed from Kyoto to take up his residence there on the fall of the Shogunate in 1868. It lies on the Sumida-gawa, one of the rivers which drain the largest plain in the empire, and, with its suburbs, covers an area of 190 square miles. The government offices, banks, public offices, and the various barracks are now the most conspicuous buildings. Besides much artistic work in lacquer, bronze, and ivory, Tokyo now possesses numerous industries for such purely Western commodities as blankets, matches, glass and hats. There are also many chemical works, ship-building and engine works. A suburban line of railway connects the termini of the trunk lines running north and south, these being fed by various branches which traverse the plain. Tokyo has no harbour. Only vessels of light draught can enter the river. *Kyoto*, also called *Saikyo*, was the capital of Japan from A.D. 794 until 1868. Though the city has, in modern times, greatly diminished in extent and population, its historic associations, together with its palaces and temples, its art products in bronze, cloisonné, porcelain, brocade and embroidery, and its picturesque native life make it the most interesting city in the empire. Kyoto is supplied with water from Lake Biwa, about ten miles distant, both by river and canal. *Osaka*, lying on the Yodo-gawa, the river which drains Lake Biwa, and only twenty-six miles distant from Kyoto, was already a flourishing commercial centre at the beginning of the seventeenth century. It was also then noted for its castle and the magnificence of the palace built within its walls. At the present day the city covers an area of nearly sixty-four square miles, and is intersected by numerous canals to facilitate the transport of commerce. Osaka is the chief centre of the cotton-spinning industry. A considerable development in ship-building, on European lines, has likewise to be noted. The foreign import trade of Osaka is largely merged into that of Kobe. *Nagoya*, the capital of the province of Owari, is the largest commercial city on the Tokaido Railway which connects the modern with the ancient capital. Its political importance dates from feudal days, the founder of the House of Owari having been a son of the great Shogun Ieyasu. The plain in which Nagoya stands is one of the most

FIG. 279.—*Tokyo or Yedo Bay.*

extensive to the east of the central range of mountains, and is devoted to the cultivation of rice. The chief manufactory of porcelain in Japan is at *Seto*, a village thirteen miles distant. Several other villages in the neighbourhood produce porcelain and pottery, largely for the foreign market. The cloisonné of Nagoya is highly esteemed. *Yokohama*, the leading "open port" of Japan, stands near the entrance to Tokyo Bay, eighteen miles by rail from the capital, for which it is, practically, the port. From being a mere fishing hamlet when first opened to foreign residence in 1859, Yokohama has now a population of over 170,000, and transacts more than half of the external trade of the empire. *Kobe* ranks next in importance, both in regard to population and to volume of trade. Its situation at the eastern end of the Inland Sea and close to Osaka and Kyoto makes it the principal outlet for the rich products of central Japan. The other open ports are Nagasaki in the south-west of the island of Kyushu, Hakodate in Yezo, and Niigata on the north-west coast of the Main Island. *Nagasaki* owes its prosperity to the coal-fields in its immediate vicinity and to the large docks within its magnificent land-locked harbour. Ship-building has lately been undertaken with considerable success. *Hakodate* is the emporium for the vast resources of the northern island in agriculture, fishing, and coal. *Niigata*, being unfavourably situated, has never had any appreciable share in the external trade. Its chief exports are rice and petroleum. *Hiroshima*, the capital of the province of Aki, stands on the northern shore of the Inland Sea. It suddenly rose into prominence during the war with China in 1894–95, when the Emperor, as commander-in-chief of the army, made it his headquarters. Its productions in bronze, lacquer, and other artistic work claim attention. Other important towns are *Kanazawa*, in Kaga, and *Sendai*, in Rikuzen, each with a population exceeding 80,000. *Kumamoto* and *Fukuoka*, in Kyushu, and *Tokushima*, in Shikoku, have over 60,000 inhabitants.

Japanese Possessions.—The **Luchu Islands,** which extend in a south-westerly direction from Kyushu, were formally claimed by the Japanese in 1879, and incorporated into the prefectural system under the name of *Okinawa-ken*. Previous to that date the Luchuan king had paid yearly tribute to China as well as to the old feudal lords of Satsuma in Japan; but both in race and language the people are closely allied to the Japanese. The largest islands are Oshima and Okinawa (Great Luchu), in the latter of which is situated *Shuri*, the capital. The port of *Nafa* lies some three miles distant. The area of the islands is estimated at about 1,500 square miles, with a population of 170,000. Rice and sugar constitute the chief products.

Formosa, called by the Japanese *Taiwan*, which, with the small Pescadores group, was annexed after the war with China in 1894–95, may be said to be Japan's only foreign possession. It has an area of about 14,000 square miles, with a population (excluding the savages) estimated at 2,700,000. The area of the Pescadores is only some 47 square miles, with

a population of 50,000. The centre and east of Formosa consist of mountains covered with virgin forests of camphor-laurel and other trees, and inhabited by aborigines of Malay race, some having a tincture of civilisation, others still head-hunting savages. The western side is a rich alluvial plain cultivated by Chinese settlers, who produce large quantities of rice, sugar, tea and hemp. Coal, sulphur and other minerals are worked on a small scale. The principal ports are *Kelung* and *Tamsui* in the north; *Anping* and *Takao* in the south-west. The external trade is chiefly in British hands.

The **Kuriles** (*Chishima*) form a chain of barren, inhospitable islands, several of them containing active volcanoes. The most southerly islands are inhabited by Japanese and Ainu, while the more northerly are annually frequented by seal-hunters. The islands were ceded to Japan by Russia in 1875 in exchange for the southern portion of Sakhalin.

STATISTICS.

	1886.	1898.[1]
Area of Japan (square miles)	148,742	161,198
Population of Japan	38,151,217	46,453,249
Density of population per square mile	256	288

POPULATION OF LARGE TOWNS (1898).

Tokyo	1,440,000	Kobe (Hyogo)	216,000
Osaka	821,000	Yokohama	194,000
Kyoto	353,000	Hiroshima	122,000
Nagoya	244,000	Nagasaki	107,000

ANNUAL TRADE OF JAPAN (*in yen*).

	1871–75.	1881–85.	1891–95.
Imports	26,000,000	28,400,000	94,000,000
Exports	19,000,000	34,300,000	102,000,000

ANNUAL TRADE OF JAPAN (*in pounds sterling*).[2]

	1871–75.	1881–85.	1891–95.
Imports	5,200,000	4,300,000	9,400,000
Exports	3,800,000	5,200,000	10,200,000

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[1] The figures for 1898 include Formosa and the Pescadores.

[2] Owing to the fall in the value of silver the exchange value of the *yen*, which was 4s. 2d. in 1871, was 2s. in 1895. In the table the value for the period 1871–75 has been taken as 4s., that for 1881–85 at 3s., and that for 1891–95 at 2s.

CHAPTER XXX.—THE MALAY ARCHIPELAGO

By Henry O. Forbes, LL.D.

I.—GENERAL CHARACTERISTICS

Position and Physical Divisions.—The Malay Archipelago occupies that immense island-strewn region lying on both sides of the equator, between the 95th meridian east of Greenwich and the western coast of New Guinea, an area embracing 40 degrees of longitude, and extending 30 degrees south of the 20th parallel of north latitude. The region, though invariably spoken of as a geographical whole (as politically it almost entirely is), is far from being homogeneous, so that its usual appellation is not altogether appropriate. Its physical and biological characters clearly divide it into two distinct parts. From the Strait of Sunda east to about 118 degrees east there lies a submarine plateau hardly 50 fathoms deep, while beyond that line all the way to a bank close to the coast of New Guinea, extends a deep sea with deeper basins.

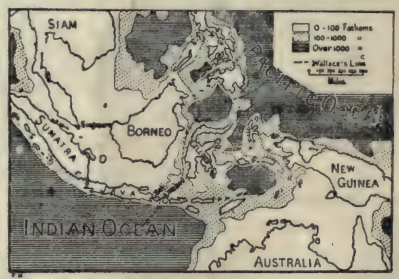

FIG. 280.—*The Malay Archipelago showing Wallace's Line.*

The boundary line between this plateau and the deeper sea, known as Wallace's Line (after the distinguished naturalist who first indicated its existence), lies close to the east of Borneo, and may be prolonged through the outer margin of the Philippines and Formosa to the Asiatic mainland. The biological features of the region show that, in all the islands to the west of Wallace's Line, the forms of life are the same as, or closely related to, those of the Asiatic continent, while on most of the islands to the east they as unmistakably point to Australia as the centre whence they have spread. This line, therefore, clearly follows what, in very recent geological times, was the shore of the continent of Asia. With the exception of Celebes the islands to the east, rising out of deeper water—the result of longer continued subsidence—have also at various times formed part of a greater Australasian continent than the present.

From the Asiatic plateau rise the Philippines, and the Greater Sunda Islands (Java, Sumatra, Borneo). Over the deeper eastern seas are spread

the Celebes; the Moluccas (Halmaheira and the intervening islands to Ke) and the Lesser Sunda Islands, a chain 1,200 miles in length, from Lombok to Timor-laut.

The remarkable specialisation of the fauna and flora in the Philippines, demanding a long period for its accomplishment, indicates that this group was earlier separated from the continent than any of the Sondaic Islands, as the deep water in its neighbourhood would also imply. Indeed, but for the Palawan and Sulu banks it would be isolated from the plateau. The results of a comparison of the forms of life in Java with those in Sumatra or Borneo are held to warrant the belief that the latter were connected with the mainland after the separation of the former, which must have occurred during the great climatic changes of the Pleistocene period. Later subsidences severed Sumatra from Borneo, and finally separated the latter from the Malay Peninsula. Of the islands east of Wallace's Line, Celebes is surrounded by very deep seas, and in presenting a fauna (whose affinities are Asiatic), with a degree of specialisation exceeding any in the Archipelago, it proclaims the still greater antiquity of its separation from that continent, and its entire isolation ever since, by the absence of forms that ought otherwise to have been present. Of the island-groups with characteristically Australian affinities the Lesser Sunda Islands were probably detached from the Australian mainland before the Moluccas, which appear to have been separated subsequently to the submersion of the Asiatic plateau.

The most notable physical feature of the Archipelago is its vulcanicity. A chain of cones, some extinct, some dormant, and others active, sweeps in a semicircle round its border from Sumatra eastward to the Philippines. The geological structure of many of the islands is still unknown. In Sumatra, Borneo, the Philippines, Celebes, and Timor, ancient rocks occur; but most of the others are composed mainly of Tertiary strata, over which the ejecta of the volcanoes are piled to an enormous depth, and form the bulk of the high land in the Archipelago (see Fig. 19).

Climate.—The climate is tropical and humid, and with the exception of the Philippines, part of which lie within the region of typhoons, the Malay Archipelago is not subject to violent extremes. Along the equatorial belt, about four degrees wide, the wet and dry seasons, which occur with great regularity beyond those latitudes on both sides, are ill-defined. In this region rain falls more or less throughout the year. South of the equator the wet season lasts from November till March, the period which north of the line is the dry season (see Fig. 323).

Flora and Fauna.—On the west side of Wallace's Line, vegetation carpets the ground from the water's edge to an altitude of 7,000 feet, with palms, bamboos, Euphorbias, Papilionaceæ, and Artocarpeæ; with giant Altingias, laurels, oaks, and Dipterocarpeæ. Monkeys, tigers, rhinoceros, tapirs, elephants, and ruminants roam the islands; woodpeckers, trogons,

barbets and pheasants people the forests. On the east side, Eucalyptus, Casuarinas, phyllode-bearing Acacias, Podocarpeæ, and Cycads, unknown in the west, mark the Australian character of the flora. The terrestrial mammals just named are absent. The Cuscus and other marsupials take their place. Cockatoos, megapodes, cassowaries, and Birds of Paradise meet the eye, while woodpeckers, barbets, and pheasants are conspicuously absent.

Native Peoples.—Viewed generally the archipelago is peopled by Malays, who are mostly Mohammedans, and Melanesians, who are nearly all pagans. Although predominant to the west of Wallace's Line, the Malay has spread to the nearer Sunda Islands, and many of the Moluccas. The Melanesians occupy the more eastern islands. The Malay is typically a short olive-brown Mongolian, with a round head, straight hair, bare face, wide cheeks, and slightly oblique eyes. In temperament he is sedate, morose, ceremonious, yet revengeful and cruel. The Melanesian is a sooty-brown Ethiopian, tall, with a long head, covered with a mop of frizzly hair, a narrow face, often well bearded, and with a prominent nose ; in temperament he is lively and boisterous. The origin of these races is a complex problem. The Malays, as known to us in purer Atjinese and Sundanese—a race developed through the commingling of Caucasian and predominating Mongol blood in Indo-China—were the last incursionists into the region. They followed an earlier pure-Caucasian migration—known as Polynesians, whose last remnants in the Archipelago linger in the Mentavi islands on the west coast of Sumatra—who drove the Negrito autochthones of the Archipelago out into the remote interior of the Philippines and other islands, and were themselves overwhelmed by half-breeds of Mongol and predominating Caucasian blood, now known as Indonesians, of whom the Battaks and Dyaks are survivors.

In like manner the Melanesians of the Solomon and New Hebrides Islands, migrating westward into the eastern part of the Archipelago, partly supplanted, partly commingled with the Negrito autochthones; and then Caucasioid (Polynesian) pre-incursionists, whose strain appears still in many of the people, as well in their language as in their customs. Throughout the Archipelago low Malay is the *lingua franca* on the coasts ; but each island has its own dialect, or language, and sometimes many languages are spoken in one island.

Political Divisions.—Politically the Archipelago was long divided between the two European Powers, Spain and Holland. The Philippines have passed from the possession of Spain to that of the United States ; and except for the eastern moiety of Timor, which is Portuguese, and a considerable area of the north-west of Borneo, which is a British Protectorate, the remainder of the Malay Archipelago forms the magnificent possession of Netherlands-India.

II.—THE PHILIPPINE ISLANDS

Extent, History, People and Trade.—The Philippine Islands, numbering some 1,200, separated by narrow channels, covering an area not quite so large as the British Islands, with a population of 7½ millions, lie between 21° and 4° N. and from 116° to 128° E. Most of the islands are extremely irregular, high and intensely volcanic. The loftiest mountain in the group attains 10,000 feet of elevation. The rainfall is heavy, the vegetation luxuriant, and there are innumerable lakes and rivers. The mean temperature is about 84° F., and the annual range under 40°. Though fever and many zymotic diseases, preventable by better sanitary supervision, prevail, the Philippines are fairly healthy. The inhabitants are Malays, much crossed with Chinese blood, Negritoes, and a few Indonesians.

FIG. 281.—*Philippine Islands. The map includes 700 miles by 500.*

Discovered in 1521 by a Spanish squadron, under Magellan—who lost his life on the occasion, fighting with the people of Zebu—the Philippines were called St. Lazarus Islands, which twenty years afterwards was changed to their present name, in honour of Philip II. Only in 1565, however, forty years after their discovery, first Zebu, then Panay, and finally Luzon, were taken effective possession of by a force under Miguel de Legaspi. After that date Spain held the whole group, though several of the southern islands hardly acknowledged her authority. By the capture of Manila in 1898 the United States of America undertook the control of the islands and the Spanish forces were withdrawn.

The chief products of the group are tobacco leaf, cigars, hemp and sugar, which make up nine-tenths of the value of the exports; and also coffee, indigo, copra, rice, and pine-apple fibre. The Philippines, under the Spaniards, were administered by a Captain-General, under whom were the four Governors of Luzon, Bisaya, Mindanao, and the Adjacent Isles. Every religion was forbidden except the Roman Catholic, whose priests consequently became very influential.

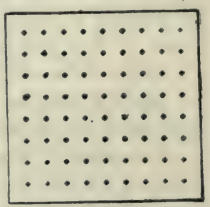

FIG. 282.—*Average population of a square mile of the Philippines.*

Since occupied by the United States the group has been organised into 39 provinces, each under a Governor, while municipalities have been formed and schools established. There is also a Governor for the whole group, assisted by a legislative body of seven.

Principal Islands and Towns.—Luzon Island is the largest and most fertile of the group. Sugar and tobacco are largely cultivated. There are a few miles of railway and telegraph lines, and it is proposed to extend the railway system by the construction of a trunk line 600 miles long; a transverse line from Manila to the east coast; and various branch lines. *Manila*, the capital of the Philippines, was captured and founded in 1571. It is protected by *Cavité*, nearer the sea, on the Bay of Manila, a fortified harbour with an arsenal and dockyard, which was taken by Admiral Dewey for the United States in June, 1898. The Manila Observatory, founded by the Jesuit, P. Federico Faura, in 1865, has a world-wide celebrity. The volcano, Mount Mayon, 9,000 feet in height, is noted for its disastrous eruptions. *Iloilo*, in the Island of Panay, with an excellent harbour, is the second city in the Philippines in commercial importance. It largely exports sugar, tobacco, Manila-hemp, and perfume. Coal beds are found in Samar and in Zebu, whose chief town of the same name is the oldest settlement of the colony. On the island of Mactan, in its harbour, Magellan, the navigator, was killed before he had completed the first circumnavigation of the globe.

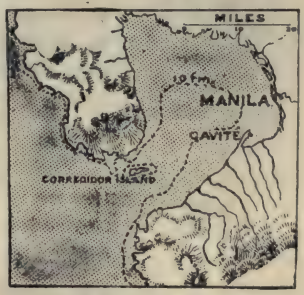

FIG. 283.—*Manila Bay.*

Mindanao island, the next in size to Luzon, is very fertile. It contains gold, quicksilver, and coal in considerable abundance, and there are valuable forests of ebony and teak. *Zamboango* is its chief town. The Sulu islands, which form part of the government of the Philippines, are ruled by a tributary but very powerful sultan. Palawan and Balabac islands are geographically and biologically part of Borneo. *Puerto Princessa* is the chief town and port. Burial caves of vast antiquity, containing bones, vases, and ornaments of Chino-Japanese origin, indicate an early Mongolian occupation, of which all tradition is lost.

III.—BRITISH BORNEO

British North Borneo.—Although most of the Malay Archipelago fell into the possession of the United Kingdom in 1811, it was returned to its former rulers in 1817, and now only a part of Borneo, about the area of Great Britain, is under British protection. British North Borneo occupies the northernmost part of the island. Ceded to a company under grants from the Sultans of Brunei and Sulu, which were confirmed to it by Royal Charter in 1881, it was in 1888 proclaimed a British Protectorate, to which Labuan Island was annexed in the following year. Tobacco, coffee and pepper are largely cultivated.

These, with forest products of the same kind as those described under Dutch Borneo, form its export trade. The revenue is derived from the opium and spirit rents, import duties, licenses, and royalties. *Sandakan*, on the north-east coast, is its chief town, and a telegraph cable connects the Protectorate with Singapore.

Brunei is a small native State lying between British North Borneo and Sarawak, and is ruled by a Sultan, who came under British Protection in 1888. The name of this State has come, in a slightly modified form, to be applied to the whole great island.

Sarawak, considerably larger than British North Borneo and Brunei combined, has a coast line of 400 miles on the north-west side of the island. It was in 1842 made over to an Englishman, Sir James Brooke, by the then Sultan of Brunei, and administered for nearly fifty years by that gentleman and his successor. In 1890 it was proclaimed under British Protection. Sir Charles Brooke is the present Rajah. His capital is *Kuching*, on the Sarawak river, a little over 20 miles from its mouth. The exports are the same, and the revenue is raised on the same subjects as in British North Borneo. Gold, and other precious metals, diamonds, and coal beds, are amongst the natural products of the territory.

FIG. 284.—*The badge of British North Boreno.*

The natural features of British Borneo, which, as a whole, includes practically the entire north-western drainage area of the island (see Fig. 287), are described along with those of the Dutch possessions.

IV.—THE DUTCH EAST INDIES

Government and Administration.—With the exception of the Philippine Islands, British Borneo, and half of the island of Timor the whole Archipelago is a Dutch possession, Netherlands-India (*Nederlandsch Oost Indie*) or the Dutch East Indies. The area of these colonies is sixty-two times as great as that of the mother country; they are all ruled by a Governor-General appointed by the States-General in Amsterdam, assisted by a Council (*Raad van Indie*). Under the central authority the whole of the islands is divided into Governments and Residencies according to the importance of the provinces. Each governor or resident has under him assistant residents, subordinate to whom are controllers, one for each district. These officers exercise almost unlimited administrative and judicial powers. In the tributary States the resident *advises* the native potentate to whom he is accredited, who carries out these instructions by his own subordinates. In the provinces which are directly governed, the controllers assume the same attitude to the native chiefs, who are held responsible for the due execution of the government

behests. The army, composed partly of natives and partly of European mercenaries, under Dutch officers, numbers about 40,000 men. The navy consists of about 80 vessels, of which the majority are colonial and the remainder of the Dutch Royal Navy.

Since 1830 the Dutch have farmed all the more valuable cultures in Java, and also in West Sumatra and the Minahassa, in Celebes, as monopolies, which the natives have been forced—as the tax they were best able to pay—to plant and crop gratuitously, and to deliver the produce at the government stores at a fixed price. The result was a large yearly revenue to the government, and to the native, remuneration abundantly sufficient for all his needs. The general prosperity of the people under this *régime* is evidenced by the continued (and in some places extraordinary) increase in the population of the islands. The monopolies, except coffee, have now been abandoned, and forced labour, except for one day a week on the roads, has been commuted for a small yearly money tax.

Under the Dutch there live in the Archipelago about 35,000,000 people, of whom only 63,000 are Europeans and half a million Chinese. In the Courts of Justice, Europeans are tried according to the laws in force in Holland, and the natives by the same modified according to Malayan customs and institutions.

The revenue of the Possession is mainly derived from the Government monopolies—the railways, the farming of salt and opium—and the sale of coffee grown under forced labour, with duties (import and export), and taxes. Coffee and sugar are by far the most important exports ; tobacco, tea and indigo following. There is a small inter-insular trade done in krises, for which the native blacksmiths are famed, and in articles of dress, particularly sarongs, peculiarly dyed (or *batek-ed*) in Java.

GREATER SUNDA ISLANDS

Java.—Java, although not the largest of the Greater Sunda Islands, is the most important of the Dutch possessions. It is the most fertile, the most highly cultivated, and the most densely populated island in the Archipelago. It lies entirely between 6° and 8° S., and is 590 miles in length, from west to east. The south coast is bold and rocky, the northern low and fringed with mangrove swamps. The whole surface of the island is mountainous, with only a few elevated plateaus, the highest summit reaching 12,000 feet, and there are a score over 9,000 feet. No equal area of the globe contains so many volcanoes ; the whole island is practically covered with the mud—they rarely discharge lava—

FIG. 285.—*The Volcanoes of Java*

which they have thrown out. The few sedimentary rocks which occur, are entirely of Tertiary age. The rivers are numerous and fairly large, but none are navigable, and there are practically no lakes. Luxuriantly clothed with vegetation, Java is a paradise to the botanist. Monkeys (*Semnopitheci*), apes (*Hylobates*), tigers, leopards, rhinoceros and wild cattle (*Bos banteng*) are its more conspicuous mammals. Over 200 species of birds, including pea-fowl, are found in its jungles and mountains. A fossil (*Pithecanthropus erectus*), remarkable for its combined human and simian characters, has been discovered in Tertiary strata in the Bengawan valley.

People and History of Java.—The west of Java is peopled by the Sundanese, the east by Javanese, and the island of Madura at its eastern extremity, which is always included with Java, by a distinct race, the Madurese. All of them are Malays, but in the Javanese there is a strain of Hindu blood. In addition there is a large population of Chinese, Arabs and other nationalities. In some districts the density of the population is as high as 900 to the square mile. The three chief languages differ from each other widely. Javanese, however, is the most elaborate and highly developed. It possesses both a court and a vulgar dialect, and has a script, peculiar to itself, which had its origin in India. All three peoples are Mohammedans, tinctured in the west with Paganism, and in the east with Brahmanism. They are all very skilled agriculturists, and employ a most elaborate system of irrigation.

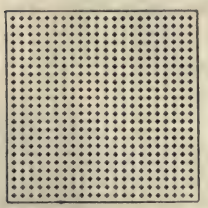

FIG. 286.—*Average population of a square mile of Java.*

The first immigration into Java, so far as known, by races subsequent to the Malay occupation, was by Hindus, probably about 800 years before their power was broken by Arab Mohammedans in 1478. They introduced their religion and a high civilisation into eastern Java and the island of Bali, which is attested by the ruins in those regions of great cities, and vast and finely sculptured temples. Between 1511 and 1550 the Portuguese reached the island and did some trading with the people of Bantam, where the first Dutch post was established in 1595. In 1602 the Dutch East India Company was formed, and in 1609 a fort was erected at Batavia, but it was not till sixty years later that the first territorial acquisitions were made, which have extended into the splendid possessions of to-day. In 1685 the English, who had also been attracted to Bantam, but had been forced to give way to the Dutch, moved to Benkoolen, in Sumatra, leaving Java free to their rivals. In 1798 "The Company," as the ruling power still continues to be called by the natives, was dissolved, and the mother country assumed the direct government of Netherlands-India.

Divisions and Towns of Java.—For administrative purposes, Java with Madura is divided into 22 residencies. *Batavia*, the capital, is a large town situated on a low plain, at the mouth of the Tji-liwong. It con-

sists of the original Batavia, and the new town, a couple of miles to the south. The former contains the native quarter, the Stadt-house, and the business offices and godowns; the latter the hotels, the European residences, the official palace of the Governor-General, and the government offices, surrounding a large park—the King's Plain. Canals everywhere traverse both towns, lined by trees which shade the streets that run beside them. Nearly every dwelling—native and European—is embowered in vegetation. A few miles east of the Tji-liwong mouth, a fine harbour has been built at *Tandjong Priok*, whose stone piers are capable of accommodating the largest vessels. It is connected with Batavia by canal, road and railway. On the hills, 35 miles south, is the town of *Buitenzorg*, at an elevation of 750 feet, a delightful sanatorium, surrounded by high mountains and amid most beautiful scenery. It is the usual residence of the Governor-General, whose palace stands in the richest and most beautiful botanical garden in the world. *Bantam*, on the north-west coast, one of the most important cities of the East in the sixteenth century, was the site occupied by the Portuguese, Dutch and English, on their first reaching Java. *Samarang*, a seaport situated about the middle of the north coast, is commercially important, but its open roadstead is often a rough and unsafe anchorage in the west monsoon. It is connected by railway with the main line through the middle of the island. Some 30 miles south is *Soerakarta*, the most populous town in Java. It is the capital of the independent territory of the Susuhunan, or emperor, who resides there; but while retaining his court and state, he is guided and "advised" by a Resident. Still further south, *Djokdjokarta*, also the capital of a dependent sultanate, was long the rival of Soerakarta. Both are now stations on the Central Railway.

Ruins of the temples of the Hindu period are widely spread over the whole of this region; those of *Boeroboedur* are celebrated for their extent and magnificence. *Tjilatjap*, a free port, and the only good harbour on the south coast, is connected with Samarang and Soerabaya by railway. *Soerabaya*, at the mouth of the Solo river, at the eastern extremity of the island, is one of the largest towns in Java, and the most important commercially. It has grown up on a natural harbour that cannot be excelled. A short distance from the town are the ruins of *Madjopait*, the ancient Hindu capital, which the Arabs destroyed in 1478.

Neighbouring Islands.—Large clusters of small islands are scattered along the northern coast of Java. The traveller entering the Strait of Sunda is face to face with his first evidences of the volcanic nature of the region in a series of symmetrical cones, of which **Krakatao,** shattered by the memorable outburst of 1884, is the most remarkable. On emerging from the strait into the Java Sea, he has to thread his way amid clumps of verdure, set in the alabaster basins of their coral beaches, known as **The Thousand Islands,** as far as the Roads of Batavia, which for centuries was the great anchorage of the East, till the harbour of Tandjong Priok was built. Karimon Java, Bawean and Kangeang are the remaining more important

clusters. Two or three small islands off the south coast are so close to the mainland that they may be reckoned as part of Java itself.

Bali.—This island lies near the eastern edge of the submerged Asiatic plateau, separated by a shallow and narrow strait from Java. It is usual to reckon Bali as the most westerly of the Lesser Sunda Islands; but, connected as it is with the Asiatic plateau, it is geographically, as it certainly is biologically, a part of Java, and ought never to be disassociated from the Greater Sunda Islands. It is very mountainous and volcanic; the highest peak, Gunong Agong, rising to 10,000 feet, is a dormant volcano. The streams are numerous but small, and there are few lakes. The Balinese are Malays with a strain of Hindu blood, who still retain the Brahmanical religion, which elsewhere in the Archipelago is lost. They possess an extensive literature in a language of their own, written in slightly modified Javanese characters. In the working of iron and gold their artificers have a high reputation. As agriculturists they are very successful owing to their skill in the irrigation of the soil. Bali produces coffee, rice, and tobacco; these, with copra and cattle, are the chief exports. Various small rajahs divide the ownership of the island among them. *Buleleng*, the chief town and port, is the seat of the Residency, which includes Lombok.

Sumatra.—The second island of the Archipelago in size is Sumatra, which forms the western boundary. It extends in a north-west and south-east direction for six degrees on each side of the equator; it is over 1,000 miles in length, and in greatest breadth about 300. Including the surrounding islands, it is more than three times larger than Java, although its population is only one-seventh of that of the more favoured island. It is separated from the Malay Peninsula by the Strait of Malacca, and from Java by the Sunda Strait. The main physical feature of Sumatra is a high narrow mountain chain—the Barisan—buttressed by plateaux in some parts and studded with dead, dormant and active volcanoes along its west coast, and a wide alluvial plain on the east side, from north to south, formed by the deposits resulting from the long denudation of the Barisan. In the mountains, Palæozoic slates, schists, and limestones have been found; but Secondary rocks appear to be entirely unrepresented in the island, which is chiefly composed of Tertiary strata, containing extensive deposits of coal. The rivers on the west side are numerous, but short, rapid, and unimportant; those flowing to the east are also numerous, but large, placid, and navigable, many of them for several hundred miles across the alluvial plains. The more important from north to south are the Rakan, the Kampar, the Indrigiri, the Batang-hari, and the Palembang, of which the last two carry to the sea the waters of four degrees of latitude. There are numerous lakes—Toba, high up among the mountains in the north, Korintji, and Ranau being the largest. Since Sumatra is crossed by the equator the seasons in the north are the opposite of those in the south. Along the equatorial belt there are no definite monsoons, and rain squalls occur throughout the year. The plains, from their humidity and

high temperature, are very unhealthy ; but on the mountains, at elevations over 3,000 feet, no better climate can be desired.

The flora of Sumatra is exceedingly rich ; the whole surface of the island is forest clad. Gutta-percha trees—from whose abundance Sumatra derived its name of *Pulo Perlja*—are among the most valuable denizens of its forests. Camphor trees, Dipterocarpeæ, many of the species attaining to a great altitude, and *Pinus Merkusii* are also notable. Among its mammals the tapir, the mountain goat (*Antilocapra sumatrana*), the elephant, and the orang-utan are characteristic, while among its birds the Argus pheasant and the Bronze-tailed peacock-pheasant may be specially named.

People and History of Sumatra.—The people are pure-blooded Malays, but among them are interspersed colonies of Melanesians (*e.g.*, the Battaks), a Malayo-Caucasian race. High Malay, or dialects of it, is the language spoken throughout Sumatra. In the Lampong, Palembang, and Battak regions it is written in a character whose origin has been traced to the Indian mainland and to Phœnicia. In the eastern plains the people are mostly Mohammedans ; in the mountains they are mainly Pagans.

At an early but unknown date Sumatra received a large incursion of Hindus, whose traces are left over a wide area in numerous stone sculptures, which, however, are far ruder in execution than those in Java. The first European to visit the island appears to have been Marco Polo who remained for some months in 1291. Varthema, the Italian, is doubtfully credited with touching at Atjeh in 1505. In 1598 the Dutch formed their first settlement there. During the reigns of Queen Elizabeth and of James I. English ambassadors were sent to reside at the Court of the Sultan of Atjeh (Achin), who appears to have been then a great potentate. In 1685 the British traders, on being ousted from Bantam by the Dutch, established themselves at Fort Marlborough, in Benkoolen, which they occupied till 1824, when it was exchanged for Malacca. Since that date the whole of Sumatra—except Atjeh, with which there has been a chronic state of war now it is said successfully concluded—has been effectively occupied by the Dutch.

The trade and industries of Sumatra are similar to those of Java, but more tobacco is cultivated. Black pepper, largely grown in the Lampongs, forms an important article of export. The forest products are extremely valuable. These are principally gutta-percha, camphor, dammar, beeswax, and gambier. Gold occurs abundantly in Jambi and northern Palembang. In the Padang highlands there are valuable beds of coal. The native manufactures are few, krises, sarongs, gold and silver filigree work being the chief, but made only for sale or barter among the natives themselves. Only a few miles of railway have yet been laid down ; all the chief towns are, however, connected by telegraph with Batavia.

Divisions and Towns of Sumatra.—Including the Riow Archipelago, and Banka on its east coast, Sumatra is divided, for administrative purposes, into nine Residencies.

Telok-betong, the chief town of the Lampongs, situated at the head of a long gulf of the same name, is the principal port for the shipment of black pepper. It suffered severely by the sea-wave following the final outburst of Krakatao in 1884. *Padang*, a large and important seaport about the middle of the west coast, is the seat of the Residency, and has a large export trade from the Padang highlands, and the island groups to the westward. The Peak of Korintji, in the south of the Residency, the highest mountain in Sumatra, attains 12,000 feet in height. The large lake of the same name on the east of the Barisan, drains into the Jambi river. *Oleleh*, on the north coast, is the port for *Kota-raja*, the capital of Atjeh. From *Deli*, on the east coast, tobacco, grown on the numerous large plantations, which extend inland, forms the chief export. The leaves, which are used to form the outside wrappings of the best cigars, fetch a high price in the European market. Hence is reached the country round Lake Toba, which has an area of 500 square miles, and is inhabited by the Battaks, an Indonesian pagan race, who practice cannibalism on their enemies, but who nevertheless possess an alphabet, invented by and peculiar to themselves. *Jambi*, the capital of the Sultan of that territory, is situated on the Batang-hari river, which is navigable by steamers for nearly 500 miles. In the south-east *Palembang*, on the river of the same name, is separated from the sea by 40 miles of half-submerged alluvium. It is the capital of the Residency, and has a mixed population of Malays, Chinese and Arabs, making it the largest and busiest mart of the island, and the "receiving house" for the produce of a vast and rich area, brought by raft and boat from the base of the Barisan. The city, a great part of which is built on floating platforms, is quaint and picturesque, and altogether one of the most interesting towns of the Archipelago. Mount Dempo, one of the peaks of the Barisan, is its highest mountain. In the south-east corner of the Residency is *Ranau*, a district surrounding a lake of the same name, noted for the excellence of its tobacco.

Islands of Sumatra.—Of the satellite islands lying off the east coast—the Riow Group, Banka and Bileton—the two last are the most important in containing the famous tin mines (discovered in 1709), which yield annually an average of nearly 10,000 tons of ingots. Off the west coast, and some 70 or 80 miles off, lie the Nias, the Nassau, and the Mentawi Islands, the last named forming the largest and most important group. Its islanders are noteworthy as being the only remnants now inhabiting the Archipelago of the Caucasioid stock from south-eastern Asia, who ousted the Negrito autochthones, and for a time occupied probably all the islands east to the Pacific, where they are now found.

Borneo.—The largest island of the Archipelago, and the third on the globe not ranking as a continent, lies across the equator between 7° N. and 4° S. The Balabac Strait and the Sulu Sea separate it from the Philippines, and the Macassar Strait from Celebes. The island is irregularly triangular, and its northern and southern coasts are more irregular than

those on the east and west. Its geological structure proves it to be a fragment of a continental land. The central mass of Tabang, with its radiating range of mountains, contains strata of all ages from Primary to Quaternary. Between its mountain arms, low level alluvial valleys extend far back into the country, which would by a small amount of subsidence in the south and east be overflowed by the sea to the centre of the island. Few of the mountains, except Kinabalu in the north, are high, and none are volcanic. There are no lakes of any magnitude ; but of its rivers, which are numerous and tortuous, a few are large. The Barito, flowing due south, the Kapuas, running west almost on the equator, the Bulangan, flowing due east, the Redjang, flowing due west to a great delta on the Sarawak coast are the chief. Most of them can be navigated by boats far into the interior.

The meteorological conditions and climate of Borneo are very similar to those prevailing in Sumatra—an equatorial belt of variable weather divides the northern from the southern regions, which are regular, but opposite in season. The fauna and flora also agree very closely indeed with those of Sumatra, but the tiger and the tapir are absent. Borneo has, however, a peculiar anthropoid—the Nosed Monkey (*Nasalis larvatus*)—and is rich in birds, over 500 species inhabiting its forests and mountains.

FIG. 287.—*Borneo.*

People, History and Trade of Borneo.—The inhabitants—Dyaks and Kayans, by name—now much mixed with Chinese blood, are largely Indonesian pagans who occupy the interior of the island. The coasts are tenanted by Chinese, Arabs, and chiefly Malays from western Malaysia, of whom the tribes known as Bajans still live by piracy. Some of the southern districts seem at one time to have been occupied by Hindus. In the north-west of Borneo, the Sulus predominate. The Dyaks are less civilised than the Sumatrans ; they have no literature, and no script. They live in large communal pile dwellings, and are spoken of as likeable savages by those who have lived among them. Their head-hunting—the sign amongst them of manhood—is practised, not from bloodthirstiness, so much as from conformity to inexorable custom which demands it as an essential to matrimonial success. They have no manufactures beyond the fabrication of a few krises, ornaments of gold, or silk sarongs—all of high repute—for their own use or barter. Rice, sugar, and a little tobacco are all the products the people cultivate, and those mainly for their own use.

The export trade of Dutch Borneo consists of Chinese or European cultivated tobacco, sugar and pepper, and the native-collected forest produce

of edible birds' nests, bees-wax, dammar, and gutta-percha, with some bêche-de-mer and tortoise-shell. The natural resources of the island are, however, still almost entirely undeveloped. Vast fields of coal of Tertiary age, composed mainly of large dicotyledonous trees, occur in the south, near Martapura; and though there are abundant deposits of the more valuable minerals and metals, gold and diamonds are alone extensively worked.

Ludovic Varthema was the first European to visit Borneo, early in the sixteenth century; the Spanish squadron which put into Brunei on its way from the Philippines in 1521 next reached the island. Then some ten years later the Portuguese, who had touched in 1526 on their way to the Moluccas, established a few ports from which they carried on trade for over 150 years. It was not till the close of the sixteenth century, however, that the Dutch reached Borneo, where they also settled and traded for 70 years. Close on their heels came the rivals of both, the English, who fixed their stations at Bandjermassin, where they remained till the beginning of the eighteenth century, when, owing to the hostility of the natives, they left the island. Onwards from 1733, when the Dutch returned, and especially since 1825, Holland has slowly increased her territory, till now the whole of Borneo, except the region on the north-west coast under British protection (p. 559), is under her dominion.

Towns of Borneo.—Dutch Borneo is administered under two Residencies—those of South and East Borneo combined, and of West Borneo. The former province has an area thirteen times as large as Holland, though its population is less than a million. Its chief town is *Bandjermassin*, on the Riam-kina, a tributary of the Barito; most of the inhabitants live in floating raft-houses, and pile dwellings. It is a large port, keeping up frequent communication with Batavia, the rest of the Archipelago, and Singapore. *Pasir* and *Tangarong*, on the north-east coast, are the chief towns of small semi-independent sultanates, inhabited chiefly by Kayans. The Western Residency is about one-third the size of the Eastern. Its chief town is the large port of *Pontianak*, on the delta of the Kapuas river, fifteen miles from the sea, and situated on the equator. It does a large export trade, of which gutta-percha is the most valuable commodity.

CELEBES

Celebes, which lies east of Borneo, west of the Moluccas, and south of the Philippines, between 2° N. and 6° S., is remarkable for its singular configuration. Four long, mountainous peninsulas radiate from a high central mass, and there are no alluvial lowlands of any extent. Orographically, it seems to be composed of parallel ranges, separated by valleys, in part occupied by lakes. Near the centre a high peak, Mount Koruvi, is thought to be over 10,000 feet high. The rivers are mostly short and unnavigable, but the Koro, in the west, is a large stream. The oldest

strata are sandstones, crystalline schists, and limestones of pre-Cretaceous age, possibly in part Palæozoic, as biological evidence indicates for the island a great antiquity and early continental character. A deep sea probably existed in Cretaceous times, while a movement of elevation began at the close of the Eocene.

Its northern part has an equatorial climate, and the southern the definite dry and wet seasons of its latitude. Celebes is considered to be one of the healthiest islands in the Archipelago.

The people are Malays, partly pagan, partly Mohammedan, except in the Minahassa district in the northern peninsula, where they are Christianised. The southern Mohammedan races, of whom the Bugis are the best known on account of their wide trading voyages over all the Archipelago, use a script resembling but not identical with that used in Sumatra.

The Makassar and Minahassa districts are alone effectively occupied by the Dutch; the rest of the island being ruled by rajahs, who can hardly be said to acknowledge the sovereignty of Holland. The first Dutch establishment in the island was effected at Makassar in 1618. In the middle of the seventeenth century they ousted the Portuguese, and have since then remained the nominal masters, except for the short period when (during the Peninsular War) the Dutch possessions were held by the United Kingdom. *Makassar*, in the southern peninsula, is the greatest native mart in the Archipelago; through it passes the whole of the trade of the islands to the east up to and including New Guinea—bêche-de-mer, tortoise shell, pearl shell, Birds of Paradise skins, and spices. From *Dongala* on the west coast, the seat of an independent rajah, excellent horses are exported. *Menado* is the chief town of the Minahassa, one of the richest and best cultivated provinces in the Dutch possessions, long famed for the excellence of its coffee. The people, who are Christians, cultivate these government coffee gardens under the forced-labour system; but, exercised as it is under a kindly paternal government, the people are prosperous, happy, and contented, as, indeed, they are almost nowhere else in the Archipelago. The Minahassa plateau, rising to 2,000 feet above the sea, is one of the most beautiful and fertile in the world. *Kema*, on the opposite side of the peninsula, twenty-three miles from Menado, is the port of the province during the west monsoon, during which a dangerous surf prevails at Menado.

FIG. 288.—*Celebes.*

Numerous island groups surround Celebes, the chief are the Sanghir Islands in the north; Butung, Tukang Bessi and Salaier, off its southern peninsulas.

THE MOLUCCAS

Moluccas.—Under the general name of the Moluccas or Spice Islands are included three groups of small islands clustered respectively round one or more larger islands, the principal being Halmaheira, Buru, Ceram (or Serang) and Ke. The Moluccas are traversed by the great volcanic chain of the Archipelago. Many of its islands are volcanic cones; some are raised coral reefs and others are composed of crystalline rocks of Palæozoic age. The majority are as yet but little explored. The vegetation is luxuriant and of Papuo-Australian affinities. The nutmeg, clove, and cardamom trees are the species which first made the region famous as the Spice Islands. In its fauna marsupials take the place of mammals. Kangaroos, cassowaries, and Birds of Paradise appear for the first time in our journey east. Butterflies are, like the birds, remarkable for their abundance and beauty. The climate of the Moluccas presents the variety and the differences, already noted, of a region extending on both sides of the equator. Here, however, the seasons are somewhat modified by the proximity of the islands to New Guinea.

Three races commingle in the Moluccas. A few remnants of the Mongolo-Caucasian forerunners of the Malays still linger, Malays and a larger proportion of frizzly-haired Melanesians of Papuan stock, with hordes of mixed Chinese, Arab and European blood. Most of the islands have a language of their own, but without a script. The discovery of the Spice Islands is lost in antiquity; their fame however long antedated their geographical localisation by the Western world. This was at last accomplished by the Portuguese officers D'Abreu and Serrano in 1511. The islands were annexed to Portugal in 1522, but in 1583 the natives expelled their masters. In 1613 the Dutch came on the scene and, partly by treaty, partly by force, acquired the whole of the possessions of the Sultans of Ternate and Tidore, which embraced Mindanao, the Moluccas, and the whole of north-western New Guinea, all of which, except Mindanao, still belong to the Netherlands.

Halmaheira (or Gilolo) and its surrounding islets form a very mountainous and volcanic group. They are inhabited by Melanesians, of Papuan stock somewhat mixed with Malayan blood, and it is curious that they are Mohammedan in religion, though the Melanesian strain is in the ascendancy. *Ternate*, consisting of the peak of that name, 6,000 feet in height, is famed throughout the Archipelago for its beautiful harbour. The Sultan has his residence there. *Tidore* is a minute islet, but the seat of the great rival sultanate to Ternate, through which it became a name famous in the Archipelago. *Baljian*, a considerable island, but sparsely populated, is zoologically interesting from containing a genus of Birds of Paradise peculiar to itself.

Buru, a large island to the west of Ceram, is in its western half high and mountainous, and has on its eastern side a wide alluvial plain. In the

centre of the island, at an elevation of 2,000 feet above the sea, is the lake of Waikolo. The inhabitants are Malayo-Papuan, and their chief industry is the manufacture of kajuput oil from the leaves of *Melaleuca kajuputi*. *Kajeli* is the only town of consequence.

Southern Moluccas.—The largest island of the southern Moluccas is Ceram, which as yet is very little explored. The people on the coast are Malays, and in the interior more or less pure Melanesians. Sago is the sole export. Amboyna (with Saparna, Haruku, and Nusa-laut), though small in area, is the most celebrated and one of the most interesting of the Spice Islands. To Amboyna it was that the lucrative and coveted clove-monopoly was restricted by the Dutch, and secured by exterminating the tree in every other island. The monopoly has now been abandoned in favour of a tax levied on the adult male population. This island group is mountainous, volcanic, and richly clad with vegetation. Amboyna itself is one of the healthiest islands in the Archipelago. The people are Mohammedan Malays, Melanesians (Ceramese) and Christian descendants of Europeans by native mothers. *Amboyna*, the chief town and capital of the Residency, is a large military station. Banda, 140 miles south-east of Amboyna, is a small cluster of volcanic islands rising from the depths of the Banda Sea. On Banda-neira stand the town and fort, facing west to the smouldering island-cone of Gunung Api. On Lontar, the largest of the group, are laid out the principal nutmeg gardens, for which the islands are famous, and from which the world's supply is almost entirely drawn. The value of the spice is estimated at about $450,000 annually.

The Ke Islands, consisting of between thirty and forty narrow mountainous islets, separated by small channels, extend for sixty miles north of the 6th parallel of south latitude. Numerous rajahs divide between them the ownership of the group, whose inhabitants are, with the exception of a few Malays, mainly Melanesians of Papuan origin. Their fame as boat-builders and as artistic wood-carvers has spread throughout the Archipelago.

THE LESSER SUNDA ISLANDS

The Lesser Sunda Islands form the long chain stretching from Lombok eastward to Timor-laut. Many of the links of this chain rise from the same submarine bank and thus combine into island-clusters, which must at a former time have been more closely connected together than they are now. Of these the islands from Lombok to Ombay comprise one cluster; Sumba and Timor, with Wetta and the Serwatty islands are independent links, each rising out of deep water, while the Timor-laut bank gives origin to another closely inter-related constellation. As a whole the group is arid, and less verdure-clad than the islands farther west, and both biologically as well as in appearance it is Australian. This greater dryness of these islands, especially those further to the east, is due to their proximity to the heated interior of the continent to their south and east. With few excep-

tions they are mountainous and very volcanic; many of them, however, are still but slightly known.

Lombok-Ombay Group.—The most westerly member of the chain is Lombok, separated from Bali by the Lombok Strait, only a few miles in width. The island is only twenty-five miles long, and its rivers are necessarily small, while the lakes it contain are only old craters. Rinjani, the highest summit, which rises to 12,000 feet, has an ever-smoking top, and is often a clear landmark far at sea, when the rest of the island is hidden from view. With the exception of a few Hindu Balinese, the inhabitants of Lombok, known as Sassaks, are Mohammedan Malays, with a slight infusion of Hindu blood. They have a language of their own written in the Balinese character. For half a century they lived under the tyrannous yoke of the Balinese, by whom they had been subjugated, but in 1894, unable to bear their oppression longer, they successfully appealed to the Dutch to take up their cause. The Sassaks are skilled irrigators of their fields, which yield large crops of rice and maize. They export the same products as the Balinese. *Ampanam* is the port of the island, and *Mataram*, a few miles inland, was the residence of the Balinese Rajahs. The next island, Sumbawa, a larger island, is nearly cut in two by an immense bay, on the east end of which rises the famous volcano Tamboro, 9,100 feet high, whose eruption in 1815 was only less disastrous and far reaching in its effects than that of Krakatao in 1884. *Bima* and *Sumbawa* are the capitals of the two sultanates into which the island is divided. It is celebrated throughout the Archipelago for its fine breed of horses. The island of Flores, separated by a small islet and two straits from Sumbawa, is 220 miles in length, and although very narrow, the interior is hardly known. Its inhabitants are mainly frizzly-haired Melanesians of Papuan origin, occupying the interior, and Malay traders on the coast. *Larantuka*, the administrative capital, is its best known town and its most frequented port. The islets of Adenara, Solor, Lomblen, Pantar and Ombay, standing on the eastern end of the Lombok-Flores bank, are very sparsely inhabited.

Sumba, which diverges in a north-west and south-east direction from the general trend of the chain, is almost surrounded by deep water. The inhabitants, who are pagan Malays, are excellent agriculturists, and large exporters of cattle and horses, which are shipped from *Nangamessi* by Makassar traders.

Timor.—The little islet of Savu, having a Hindu population, forms a stepping-stone to Timor of which Rotti, which lies under its west corner, is but a separated fragment. Timor, the largest of the Lesser Sunda Islands, 300 miles long, diverges from the line of the Sunda island chain. On both sides the depths exceed 1,000 fathoms. Its rocks are largely of Palæozoic age. Few of its rivers are large, none are navigable, and many of them meander through deep and wide valleys full of shingle, in which gold occurs in apparently considerable quantity. The people are of very mixed pedigree. They appear to be Melanesians (with

indications of Indonesian or Polynesian intermixture), Malays, and mongrels form the intermixture of these. At the coast there are Chinese, Arabs, Bugis and Solorese. Their agriculture is very poor; maize being the main staple of their food. Numerous pigs are reared by them. Their religion is paganism, tinctured here and there with Christianity. The country has been all parcelled out into "kingdoms," each ruled by a Rajah or Dato; nearly every one of which has its own language or dialect, though only a few miles may separate their capital villages. The Portuguese, who occupied the whole island prior to 1613, were driven from the western moiety by the Dutch, who have since retained possession of it with *Cupang* as the capital.

Portuguese Timor.[1]—The greater part of the island of Timor belongs to Portugal. The Portuguese portion includes the north-eastern end of the island, with *Dilli*, the best seaport, as the capital of the colony, which is an autonomous district for which a special administrative organisation is being introduced. The geological structure of Timor is in part coral formation and in part schistose. The reported existence of active volcanoes has not been confirmed. There are only small streams, the most important of them being the Lois. The climate is healthy in the mountainous districts; but has a bad reputation on account of the fact that Dilli is built on low and marshy ground. Timor coffee is of superb quality, and the plantations are progressing greatly. Cocoa, nutmeg, pepper, and sandal-wood grow well. Petroleum occurs and, when regularly worked, will become a source of wealth to the island. There are traces of gold, but no veins have been found. The area of Portuguese Timor is about 7,000 square miles, and the population amounts to about 300,000.

Eastern Sunda Islands.—Wetta and the Serwatty Islands are inhabited partly by Christianised Malays and partly by Papuan Melanesians. The Timor-laut group, terminating the Lesser Sunda chain, contains three larger islands — Larat, Yamdena, and Selaru — and about thirty smaller. They are mainly upraised coral-reefs, peopled by Papuan Melanesians, and Malays with Polynesian and Papuan blood in their veins. Very little is known of even the larger members of the group, and all the smaller are perfectly virgin ground to the geographer and the biologist.

[1] By Captain Ernesto de Vasconcellos.

STATISTICS OF MALAY ARCHIPELAGO.

(*Mainly estimates about* 1895.)

Province.	Area in sq. miles.	Population.	Density of Population per sq. mile.
Philippine Islands	115,000	7,500,000	65
Luzon	—	3,057,000	—
Bisaya	—	2,213,000	—
Mindanao	—	750,000	—
Adjacent Islands	—	22,000	—
British Borneo	84,000	493,000	6
British North Borneo	31,000	175,000	5
Brunei	3,000	18,000	6
Sarawak	50,000	300,000	6
Netherlands-India[1]	584,000	34,000,000	58
Java and Madura	50,500	25,700,000	509
Sumatra and Islands	184,000	3,450,000	19
Dutch Borneo	212,700	1,180,000	5
Celebes	71,400	1,998,000	28
Moluccas	43,800	400,000	9
Lesser Sunda Islands[2]	65,600	1,164,000	17
Malay Archipelago	783,000	42,000,000	54

POPULATION OF TOWNS.

Manila (*Philippines*)	150,000	Djokdjokarta (*Java*)	90,000
Soerakarta (*Java*)	150,000	Samarang „	80,000
Soerabaya „	130,000	Palembang (*Sumatra*)	50,000
Batavia „	100,000	Bandjermassan (*Dutch Borneo*)	45,000

ANNUAL TRADE (*in pounds sterling*).

(*Estimates about* 1895.)

	Philippines.	British Borneo.	Netherlands-India.
Imports	2,100,000	900,000	13,500,000
Exports	4,100,000	1,200,000	18,700,000

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[1] Not including Dutch New Guinea.

[2] Including Bali.

BOOK III.

AUSTRALASIA AND POLYNESIA

CHAPTER XXXI.—THE CONTINENT OF AUSTRALIA

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Australia.—Australia, the least of the five continents, with its southern satellite, Tasmania, stands aloof, both in character and situation, from the world at large. Unlike any of the other great land masses, it lies wholly within the southern hemisphere, without either encroaching on the equatorial region or approaching, even remotely, the antarctic circle. No other continent is so evenly parcelled out among the torrid, subtropical, and temperate zones; none so deeply lapped in great ocean expanses as to form the one prominent land area in what is known as the "water hemisphere." Severed from Africa by an average interval of 4,500, and from South America by 8,500 miles, it differs from both not merely in outline, but in the proportion that its longitudinal extent—41°, or about 2,360 miles, bears to the *average* width from north to south—17½°, or 1,050 miles. In neither of the zones most exposed to prolonged solstitial heat is there to be found another example of a land so proportioned, and at the same time so entirely withdrawn from equatorial or polar influence. Long ages of seclusion from the rest of the world have impressed on this outlying region a marked singularity in aspect, climate, and natural products. Isolation is the predominant characteristic; indications of affinity with other regions are few and obscure. Only on the north-west, where the myriad isles of Malaysia suggest a former connection with Asia, does Australia make any advance towards the clustered continents of the "land hemisphere." Even in this direction the nearest opposite points—North Cape in West Australia, and Cape Romania, at the extremity of the long-drawn Malay peninsula—are still 1,800 miles apart; while the average interval between the Asiatic and Australian continents exceeds the breadth of the North Atlantic between the British Islands and Newfoundland. Of neighbouring islands, New Guinea, separated from the north coast of Australia by the Arafura Sea, Torres Strait, and the Coral Sea; and the New Zealand group, some 1,200 miles distant on the south-east, are the most important. The south-eastern

peninsula of New Guinea, together with New Caledonia and Norfolk Island, form stations in a vast curve running approximately parallel to the east coast of Australia, while a second and larger curve can be traced through New Ireland, the Solomon Islands, the New Hebrides, and the Kermadecs, to Cape Runaway in northern New Zealand. The outer or more easterly of these two curves is studded with volcanic vents, the inner one only at the southern extremity, where both are merged in a series of active volcanoes, Tongariro, Ruapehu, and Ngauruhoe, the culminating points of the New Zealand plateau.

Coasts.—The continent of Australia is reniform in outline; the western lobe imperfectly rectangular, while the curvature of the eastern describes about two-thirds of an irregular ellipse. Simple and compact, the continent presents only two important deviations from the general outline—Arnhem Land and Cape York Peninsula, both projecting northward towards New Guinea, and enclosing the spacious, almost land-locked, Gulf of Carpentaria. The only other striking indentations of the coast are the Great Australian Bight, extending from Cape Pasley to Cape Catastrophe; and the twin gulfs Spencer and St. Vincent, between Cape Catastrophe, Yorke Peninsula, and Cape Jervis. The Bight and Carpentaria jointly determine the division of the continent into a western and an eastern half, differing not a little from each other in aspect and physical conditions. Thus the western half has a more angular contour, studded with bold prominences; more and larger estuaries, but fewer rivers, and not half a dozen that are navigable above tidal influence. Long tracts of coast show no sign of drainage to seaward, and there is but one solitary example (Sturt Creek) of a watercourse of any length flowing towards the interior. There is much uniformity of surface, and except in the far north-west and north, barrenness and poverty of organic life are the prevalent characteristics. The eastern half possesses, on a less accentuated outline, more available harbours, roadsteads, and rivers, together with some 1,500 miles of inland navigation. The mountain systems are higher, more intricate and continuous; they play a greater part in attracting and distributing moisture, in diversifying the surface, and so favouring the development of a richer fauna and flora.

Islands.—Of the islands belonging to Australia, the great majority are mere rocks, others are practically unexplored, or are uninhabited, or have only local importance. Tasmania, the largest, alone claims special mention. Cut off by Bass Strait from the south-eastern portion of the mainland, a former connection with which is still attested by chains of intervening islets, the offshoot differs greatly in outline from the parent mass. The heart-shaped contour presents a concave northern front to the prominent convexity of the opposite main; the broken coast is studded with projections and indentations; and the southerly position of the island —between lats. 40¾° and 43½°—exempts it from the peculiar climatic conditions that affect Australia proper.

Configuration and Hydrography.—Superficially, Australia represents the exposed portion of an irregular, partly submarine plateau, with an average submersion of 600 feet, the remains of an older lozenge-shaped continent, reaching from lat. 50° S. to the equator, and including Tasmania, New Guinea, Timor, and the Moluccas. Proof of a subsidence sufficient to break up the continuity of the mass is found in the extreme shallowness of the Arafura Sea and Carpentaria Gulf; the swampy shores of the latter; the concentric trend of the rivers that empty into it from the south; and above all in the Great Barrier Reef, extending nearly 1,000 miles along the north-east coast at an average distance from land of about 30 miles (Fig. 294). Of the inland area, nearly two-thirds is occupied by the Great Austral Plain. Flanked on every side by mountains or tablelands, and sloping more or less gradually towards a central depressed lake-region, the outfall of a vast system of inland drainage, this engrossing feature is by no means the unbroken level that its name implies. Heights of land or undulating downs indicate the water-partings; flat-topped hills, the ruins of a once continuous rock-cap, with, here and there, some scattered mountain groups of bolder aspect, subdivide it into lesser concavities of varying extent. Of the subdivisions thus created, the basin of the river Murray, in the eastern half of the continent, alone has an outlet to the sea. All the other subdivisions constitute systems of inland drainage ending in saline lake basins, where not absorbed by the soil or lost through evaporation. The outer portions of the great plain merge into tablelands buttressed to seaward by mountain chains, whose trend follows, approximately, that of the coast. Chief among them is the Great Divide, reaching from long. 142° E. on the south coast to Cape York, parting the Pacific waters from those that flow westward, throwing out secondary ranges on both sides of the main axis, and giving rise to the not very numerous class of Australian watercourses that deserve the name of rivers. The courses of those on the Pacific slope are of no great length, but they carry ample volumes of water, and are liable, in rainy seasons, to frequent but brief overflows. Those on the landward slope have courses of great length, carry but little water, and are flooded only at long intervals.

FIG. 289.—*Hydrography of Australia.*

The Murray, the main artery of the Murray-Darling system, is an exception, being regularly fed during the dry season by the melting snows of the Australian Alps.

The south-western coast, between Cape Leeuwin and Shark Bay, is flanked by another but shorter mountain chain, the scarp of a huge granite plateau extending inland, whose scanty drainage is discharged through a series of defiles into the Indian Ocean. On the semi-peninsular projections that diversify the coast north and north-east from Shark Bay, other less regular mountain masses are planted whose radiating trend roughly corresponds with the prominences of the shore line. The south coast, as far as the head of the Great Australian Bight, for more than 700 miles consists of a line of cliffs over 500 feet in height, merging further eastward into extensive sand-dunes. This side of the continent presents the phenomenon of a coast line nearly 1,000 miles in length, unbroken by the discharge of even the smallest watercourse into the ocean.

The drainage area of Carpentaria Gulf is bounded on the south by high downs, in which the coastal rivers discharging into it take their rise. Nearly equidistant from the east and west coasts a system of parallel chains, with a general west-north-west and east-south-east strike, occupies, with some intervening tablelands and valleys, the centre of the continent. Lastly, the wedge-shaped bulk of Flinders Range striking north from gulfs Spencer and St. Vincent, and finally bifurcating to the east and west, indirectly connects the central system with the more distant outlying spurs of the Great Divide.

The rivers of Tasmania all drain into the sea. The two principal, the Derwent, flowing south, and the Tamar, north, both rise in the central lake-studded tableland round which the mountains cluster in detached masses up to 5,000 feet in height. A smaller plateau of similar character occupies the south-western angle of the island, and from one or other of these elevated regions the larger rivers derive their chief supply.

Geological Structure.—Geologically, Australia ranks among the oldest existing lands. Two-thirds of the surface is overlaid with the *débris* of Mesozoic and Tertiary sandstones, which must once have covered the interior with an unbroken sheet. In the south-west denudation has exposed the underlying granite over an area of from 25,000 to 30,000 square miles, while the central ranges, and those of the western part of Arnhem Land, afford strong evidences of metamorphic agency. On the west and south-west of the Gulf of Carpentaria is a large irregular area of Jurassic age, and strata belonging to the same system reappear on the opposite side of the Gulf, in association with crystalline and trap rocks, in the south and middle of Cape York Peninsula. In the Great Divide, the granite combines with Silurian, crystalline, and Carboniferous rocks to form a solid, terraced axis, on whose slopes the sandstones rest. Coal seams of good strength and high quality are worked at various spots along the Pacific coast. There is apparently some reason to believe that the Blue

Mountain sandstone was formed by the action, not of water, but of wind; the process of the consolidation of wind-drifted sand into sandstone being visible at Fraser Island (Hervey Bay), at Warrnambool on the south coast, and elsewhere. Flinders Range is mainly of Silurian origin, as is also the greater portion of Eyre Peninsula, on the west of Spencer Gulf. While there is no active volcano known to exist in Australia at present, evidences of recent volcanic action are found in "Australia Felix," a district between Port Phillip and Cape Jaffa, within which no less than eighty-three distinctly marked volcanic cones, from 700 to over 2,000 feet high, have been counted, besides numerous lesser vents and crater-lakes (Fig. 301). Other volcanic indications are found in north-eastern Australia, where they are dispersed over an area of some 30,000 square miles. Such are the basaltic flows about the Cape River, the Upper Burdekin, and the Lower Burnett; such the congeries of dome-shaped craters and cones found, at intervals, about the 20th parallel.

Tasmania is, in the main, of Silurian age. Much of the interior, however, and part of the east coast is Carboniferous or Jurassic, the two systems being separated by an intervening belt of crystalline formation, along which, as in most places on the mainland, the richest and most profitably worked mineral deposits are found. Both continent and island are remarkable for their immunity from severe earthquakes. There is, however, an ironstone region about 450 miles due north from the head of the Great Australian Bight, in the Central Ranges, where, about the summer solstice, earthquakes of considerable force are stated to recur almost daily during the hotter hours of the afternoon. Apart from this isolated phenomenon, due, no doubt, to local causes, the seismic energy displayed elsewhere is but feeble, a fact attributable, perhaps, to the numerous volcanic safety valves, which, at a safe distance of from 1,000 to 2,000 miles, protect the continent on the east, north-east, and north-west.

Climate.—The climate, though in the main healthy, is subject to strange vicissitudes. The summer solstice of the hemisphere coinciding with the Earth's position in perihelion, the heat at that season is intense, even in latitudes far south of the tropic line. The enormous longitudinal extent of the continent, over which the Sun, when nearest, is vertical for nearly three hours out of the twenty-four, combines with a generally shadeless surface to favour so continuous an absorption of heat as is only paralleled in the African Sahara, where the summer Sun is more than a million and a half miles farther away. The absence of lofty cloud-condensing peaks in the central region, and the tendency of coastal chains to rob the sea-winds of their moisture, and deflect them from a horizontal to an ascending course, combine with the radiation of the Sun-parched interior to produce severe and protracted droughts. On the approach of winter, when the Earth is tending towards aphelion, the obliquity and the distance of the Sun increase together; the column of light, superheated air that rises from the inland region rapidly cools down into a dense

cushion of heavy cold air, exercising a strong lateral pressure on all sides, and manifesting itself to the warmer coast regions as a nipping, bitterly cold land-wind, lowering the temperature many degrees below the latitudinal average for the season.

Rainfall.—The rainfall is so unevenly distributed, that whole districts may be suffering from drought, while others, not far distant, are the scene of great and destructive inundations. At irregular intervals, sometimes extending over several years, the most arid parts of the interior will thus for a few days assume the appearance of a boundless, though shallow, inland sea. While the north-west and north coasts derive their rainfall from the monsoons; while the east coast is bathed in showers condensed from the south-east trade wind by the Great Divide, varied with the ampler discharge from an occasional tropical disturbance; and while the southern parts of the continent, north to some 30° of latitude, owe their rainfall to a series of progressive cyclonic movements travelling eastward from their source in the higher latitudes of the Indian Ocean—a very dry zone, from 5° to 7° wide, stretches across the interior from the west coast to about 141° E., over which the annual rainfall hardly averages 5 inches.

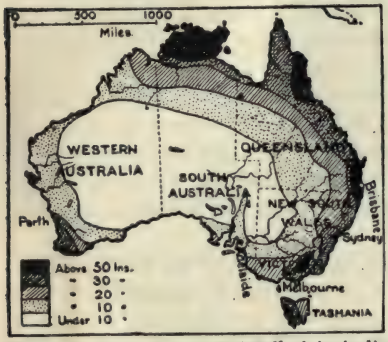

FIG. 290.—*Mean Annual Rainfall of Australia (after Supan).*

Temperature.—While subject to sudden diurnal changes, mean temperatures vary but slightly with the latitude; height and distance from the sea being the principal modifying factors. Within the marine influence frost seldom occurs and insular conditions, as a rule, prevail; whereas inland, even at slight altitudes, strong contrasts of heat and cold will be felt even in the torrid zone. Coincidently with the setting in of the tropical rains, the south and centre are liable to hot winds and dust storms, which, however, serve to dispel miasma and purify the atmosphere. The climate of Tasmania has little in common with that of the mainland, resembling rather that of South Devon or the Channel Islands. The west coast, however, is at all times liable to severe gales; the summer is short, and the winter wet and boisterous.

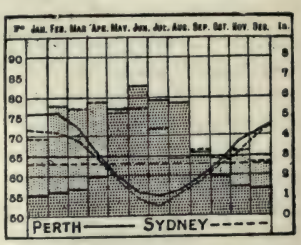

FIG 291 —*Temperature and Rainfall at Perth, W.A., and Sydney, N.S.W.*

Flora.—Organic life in Australia is in keeping with the singular natural conditions that mark the region. The native flora, where not obscured by

the intrusion of East Indian types, bears a decidedly archaic impress. The numerous genera of arborescent myrtles, the proteads, casuarineæ, araucarias, cycads, ferns, lycopods, and other orders, whose maximum development reaches back to Oolitic, Triassic, and even Carboniferous times, recall conditions of plant development once universal, though at present centred in, if not absolutely limited to, the southern continent.[1] The survival of these old-world forms was no doubt rendered possible by a long-continued process of slow adaptation to the increasing aridity of the climate, as the ancient watercourses became obliterated through the weathering of the former sandstone crust. Thus, in the more typical genera, the foliage has acquired a tough, leathery texture that enables it to resist the wilting effect of excessive evaporation; or its functions are assumed by other organs, like the phyllodia or modified leaf-stalks of certain acacias, and the branches of the casuarina; or again, in virtue of a slight twist of the stalk, it presents no reflecting surfaces, but only narrow edges to the vertical sunlight. Throughout the great myrtaceous order, which far outnumbers all other Australian types, the power of resistance is increased by abundant secretion of volatile oils, which renders the cellular tissue impervious to the heat rays, and diffuses the delightful aroma peculiar to the Australian "bush." Some of the eucalypts or "gum-trees" rival in dimensions the Californian *Sequoia gigantea*. The tallest authenticated specimen of *Eucalyptus amygdalina*, felled on the Black Spur, near Melbourne, in Victoria, measured 420 feet from the butt to a point where the top had been broken off, and at 300 feet from the ground still had a diameter of 6 feet. In the glens of the river Warren, Western Australia, *Eucalyptus colossea* attains a height of 400 feet, and the Tasmanian blue gum, *Eucalyptus globulus*, is but little inferior. Leguminous plants, chiefly represented by the genus Acacia, of which there are 300 species, whereof some 250 are peculiar to Australia, rank next to the myrtles in number and extent of range. In company with the strange order of proteads (*Banksia*, *Grevillea*, *Hakea*, *Helicia*, &c.), with the desert-loving conifers (*Frenela* and *Callitris*), and with certain beef-woods (*Casuarina*), they flourish where the hardiest eucalypts refuse to grow. The heaths, so abundant in northern Europe and South Africa, are here represented

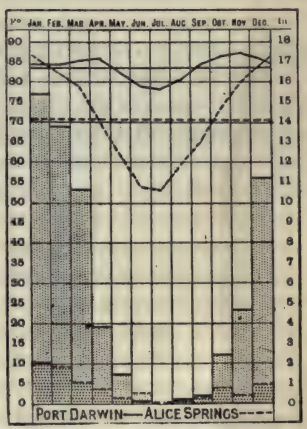

FIG. 292.—*Temperature and Rainfall at Port Darwin and Alice Springs.*

[1] South Africa and South America, for instance, both have proteads, and South America an araucaria, while a species of casuarina is common to the greater part of Polynesia. But the three orders are nowhere found in association, except in Australia.

by the allied genus *Epacris*, of which some 300 species are enumerated. In addition to the orders already mentioned, Australia is rich in composites, figs, mallows, capparids, night-shades, spurges, rue-worts, sterculiads, grape-vines, madder-worts, asclepiads, succulents, labiates, chenopods, vervains, water-peppers, sandal-woods, orchids, lily-worts, palms, and sedges. Among the more striking forms may be mentioned the baobab or "gouty-stem" tree (*Adansonia Gregorii*), the only other existing species of which (*A. digitata*) belongs to the African continent; the various species of grass-tree (*Xanthorrhœa*), arborescent rushes of strange aspect; the equally uncouth bottle-trees (*Sterculia*); the parasitic mistletoes (*Loranthus*) with their variable foliage and brilliantly-coloured flowers; the "giant lily" (*Doryanthes excelsa*) with a flower-stalk thirty feet high; the stinging tree (*Laportea*); and the gorgeous "waratah" (*Telopea*), with crimson flower-heads visible half a mile away. Most of the coast region and much of the interior is mantled with valuable grasses, of which seventy genera, comprising some 300 species, are indigenous.

Fauna.—The animal kingdom, so far as typically Australian, is as quaint in aspect as the vegetation. Excluding sundry bats, a few rodents, a feral dog, and certain marine forms, the native mammalia all belong to the primitive marsupial sub-class, and thus confirm the geological record of the antiquity of this zoological region. They comprise some forty-five species of *Macropodidæ* (kangaroo tribe); about twenty species of phalangers —variously misnamed "opossums," "flying squirrels," "native bears," &c.; four *Phascolomydæ* or wombats; ten of the *Peramelidæ* or bandicoot tribe; and twenty dasyures or marsupial carnivores, including the "striped wolf" and "devil," both confined to Tasmania, and now nearly extinct. The recently discovered pouched-mole, constituting by itself a distinct family, *Notoryctidæ*, seems to be confined to a patch of sandy desert north of Lake Eyre. Of still lower development than the marsupials are the monotremes or egg-laying mammals, of which there are two genera, the duck-bill (*Ornithorynchus*) and spiny echidna. Their semi-reptilian anatomy determines for these strange creatures a still higher antiquity than for the marsupials proper.

The numerous avifauna includes, besides those common to other regions, many characteristic forms. Such are the emu, cassowary, laughing-kingfisher, lyre-bird, black swan, bower-bird, and the mound-building megapodes. Among the reptiles are to be noted two species of crocodile; frilled, thorny, and basking lizards; many venomous and harmless snakes, and sundry long-necked tortoises. The fishes, a more cosmopolitan race, yet comprise several peculiar types, such as the lung-fish (*Ceratodus*), freshwater herring (*Diplomystus*), and cod-perch (*Oligorus*), barramundi (*Osteoglossum*), and others; most of them belonging to genera unrepresented elsewhere. Insects differ little from those of other continents. Some curiosities of the arthropoda are a "whistling spider" from the western interior, two species of Peripatus, and a burrowing crayfish, which builds

and fills for itself an underground tank, wherein to spend the dry season. Among annelids, it will suffice to mention the giant earthworm of Gippsland, which in favourable situations attains a length of six feet.

Aboriginal People.—Although there is little doubt that the north-west coast of Australia has from time immemorial been frequented by Malayan trepang fishers, the first reference to the aborigines occurs only in 1644, when Abel Tasman, the Dutch navigator, found himself seriously hampered in his attempted examination of the west coast, by the hostility of the "Indians," as they were then called. And it was nearly half a century later when the first details of their personal peculiarities and habits were recorded by the explorer Dampier. What their numbers may have been at that time it is impossible to conjecture, but calculations based on the rate of their diminution during the last half century, give warrant for assuming that when settlement by Europeans first began, the aboriginal population was at least three times more numerous than at present.

Of black, or more precisely, dark brown hue, the Australian has few other negroid characteristics. In his high facial angle, straight or wavy hair, lustrous eye, ample beard, well-shaped limbs, and spare, muscular build, he approximates more to the Caucasian than to either the Ethiopian or the Mongolian variety of mankind. Except for some slight resemblance in physical appearance, language, and habits to the jungle Veddas of Ceylon, the affinities of the aborigines of Australia with the outside world are so obscure as to baffle inquiry. That they are virtually a survival from the long dim past that dragged on unrecorded for centuries before the earliest dawn of civilisation, there is no room to doubt. Nor is there any valid reason for regarding them as otherwise than truly indigenous, *i.e.*, coeval with the existing condition of the continent they inhabit. After a full century of contact with this rapidly vanishing people, all that we yet know about them amounts to very little. As to their social development, it is still that of the earlier phases of the Stone Age, with which their weapons and implements, the practice of infanticide, ritual mutilation and cannibalism, the modes of sepulture, and the absence of chieftainship or any other authority exactly correspond. That they have occupied the continent from remote antiquity is inferred not only from the occurrence of enormous shell-mounds, the accumulation of many centuries, but from the discovery of innumerable human tracks and other impressions, together with ancient cooking places and ash-heaps, within the substance of a laminated sandstone found on the south-west coast of Victoria. Amid much diversity of speech, customs, and traditions there is yet such a general likeness as amounts to proof of a common origin. A complex code of social observances, especially in relation to marriage, prevails, with little variation, throughout the numerous tribes into which the nation is split up. Boys, on reaching puberty, are subjected to more or less cruel tests of endurance, and for every condition of life vexatious and trying prohibitions of certain kinds of food remained in force; the apparent aim of the system being to

weed out all the weaklings, to check the natural increase of population, and to guard against any tendency on the part of neighbouring tribes towards mutual fusion.

The languages, although constructed on one general plan and scarcely more than dialectically distinct, yet show much diversity in the degree of elaboration or development; some varieties being almost devoid of internal mechanism, and correspondingly obscure, whilst others, such as the Kamilaroi and the Parnkalla, have evolved a whole series of fairly regular grammatical inflections, and thereby gained vastly in precision.

The present number of the race is variously estimated at from 60,000 to 80,000, of whom, perhaps, two-thirds frequent the settled districts, while a dwindling balance still roam their native wilds unsubdued.

The Tasmanian aborigines, now extinct, had no kinship with the Australians; their physical characteristics pointing to a Papuan or Melanesian origin. Their number probably never exceeded 3,000.

These "provisional" types of mankind are now being superseded by a civilised population of European, and predominantly British lineage, with a slight and jealously watched infusion of Asiatic and Oceanic elements.

Discovery and History.—Although Australian history turns mainly on discoveries, it is doubtful when its shores were first sighted from a European ship. Traces of a belief in the existence of an Austral continent are found more than two centuries before our era, due perhaps to vague rumours spread by the Malayan trepang fishers. The geographer Ptolemy, in A.D. 150, regarded it as an extension of the antarctic land region which modern research has restricted to the polar circle, and this notion continued to sway the earliest known account—by Wytfliet in 1598—in which "Terra Australis" is recognisable as the Australia of modern maps. Wytfliet describes it as "separated from New Guinea by a narrow strait," as beginning at "one or two degrees from the Equator," and as deserving to rank as "a fifth part of the world." The discoveries of De Torres, who, eight years afterwards, navigated the strait which now bears his name, and of De Quiros, who designated the New Hebrides as "la Austrialia del Espiritu Santo," did not tend to clear up the confusion of ideas expressed in Le Testu's map of "Jave la Grande" (1542) and Descelliers' "Terre Australle" (1550). The Dutch explorations of the north, west, and south coasts during the seventeenth century, and Tasman's discovery of Van Dieman's Land and New Zealand (1642) gradually fixed the position and dimensions of the continent, thenceforth known as New Holland. Yet the most important and fertile region, that of the east coast, remained wholly unknown until examined by Captain Cook in 1770.

With the arrival of the "First Fleet" at Botany Bay under Governor Phillip in 1788, the history of Australia as a civilised land begins. Its earliest chapter deals with the struggles of the young settlement against difficulty and privation until 1813, when a track was found across the Blue Mountains, which had hitherto barred access to the interior. This event

gave the first impulse to inland exploration, while the circumnavigation of Tasmania (then called Van Diemen's Land) by Bass and Flinders in 1799 led, four years later, to the official occupation of that island and its subsequent separation (1825) from New South Wales. The examination of the coasts of the mainland, too, was proceeding apace. Flinders, in 1801–2, had surveyed the southern coast-line, and during the next year circumnavigated Australia for the first time. Oxley's exploration of the marshy tracts towards the west and north-west gave rise to the long and stubbornly maintained theory of an inland sea, while his discovery of the river Brisbane in 1823 was followed within two years by the formation of a branch settlement at Moreton Bay. In 1824 the upper course of the river Murray and the central parts of the present colony of Victoria were traversed by Hovell and Hume. Persistent rumours of an intended occupation of Australia by the French now led to the planting of military posts (since abandoned) at Western Port, at King George Sound, Melville Island, Raffles Bay, and Port Essington. The years 1827–30 were memorable for Cunningham's exploration of the Darling Downs, for Sturt's discovery of the river Darling, his boat voyage on the Murray to and from Encounter Bay, and the founding of the Swan River settlement. In 1834 stations were formed at Portland Bay, in the subordinate province of Port Phillip, and on the lower Yarra, where Melbourne now stands. In 1836 explorations thence to the west and north revealed the rich volcanic district of Australia Felix—as it was then called.

FIG. 293.—*Political Divisions and Railways of Australia.*

Adelaide, the capital of the independent colony of South Australia, was founded in 1836, and thenceforth exploration in the centre and the west proceeded rapidly. A further impulse to occupation and settlement was given by the influx of population that resulted from the discovery of gold in 1851–52. Grey's explorations on the west coast; Eyre's journey round the Bight to King George Sound; Leichhardt's overland route from Darling Downs to Port Essington; Sturt's expedition to the Barrier Range and the Stony Desert; Mitchell's discoveries in north-eastern Australia; Stuart's crossing of the continent from Adelaide to Van Diemen Gulf; and the wanderings of the brothers Forrest and Gregory in the west and north; with the relief parties sent out after Burke and Wills, and the still

more numerous expeditions dispatched in search of Leichhardt after his disappearance in 1847—soon shed so much light on Australian geography as to leave little for future explorers to fill in. The distant dependency of New Zealand had in 1840 been withdrawn from the control of New South Wales, and in 1851 the Port Phillip district likewise attained its majority as the colony of Victoria. Shortly after (1855) responsible government was conferred on all the eastern colonies; Western Australia alone continuing under Crown control, until the rapid increase of population consequent on the gold finds of 1890 paved the way for its autonomy. The contemporary history of Australia, as a whole, closes with the proclamation of a sixth colony in 1859, when the Moreton Bay District, after a protracted struggle for separation from New South Wales, became a self-governed State under the name of Queensland.

In 1901 the six colonies of New South Wales, Victoria, Queensland, Tasmania, South Australia, and Western Australia, were federated into the Commonwealth of Australia, of which they became the original States. The King is represented by a Governor-General, and the legislative authority is vested in a Senate and a House of Representatives.

STATISTICS OF AUSTRALIA.

	1901.
Area of Australia, including Tasmania and lesser islands (square miles) ..	2,972,906
Population, excluding aborigines	3,771,715
Density of population per square mile	1·27

LAND IN CULTIVATION.

	1880.	1890.	1901.
Acres	5,837,013 ..	7,679,525 ..	10,279,090

LIVE STOCK.

	1880.	1890.	1901.
Horses	1,068,402 ..	1,509,669 ..	1,625,042
Cattle	7,527,142 ..	9,903,599 ..	8,464,724
Sheep	59,175,024 ..	97,878,619 ..	72,126,626

EXTERNAL TRADE (*in pounds sterling*).

	Average 1871–75.	1881–85.	1891–95.
Imports	36,945,000 ..	46,316,000 ..	52,542,000
Exports	37,344,000 ..	45,316,000 ..	55,879,000

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CHAPTER XXXII.—THE EASTERN STATES OF THE COMMONWEALTH OF AUSTRALIA

I.—QUEENSLAND

By C. H. Barton, B.A.,
Maryborough, Queensland.

Position and Coasts.—The colony of Queensland occupies the north-eastern portion of the Australian continent for an extent of 1,200 miles from north to south, and 900 from east to west. The Gulf of Carpentaria and South Australia bound it on the west; the Pacific Ocean on the east; and New South Wales and South Australia on the south. It contains an area of about 688,000 square miles, being more than twice as large as New South Wales. The seaboard extends north and west from Point Danger in lat. 28° S. to Cape York in 11° S., and on to long. 138° E. on the south coast of Carpentaria Gulf, thus including the great Cape York Peninsula, a tract larger than Ireland, and the boldest prominence on the Australian continent. The Pacific coast, over 15° of latitude, is protected from the swell of the outer ocean by the vast natural breakwater of the Great Barrier Reef, thus admitting of coastal navigation along a smooth-water channel 1,000 miles long and from ten to thirty miles wide. Other noteworthy features of the coast are the Wellesley Islands opposite Point Parker in the Gulf of Carpentaria, enclosing a roadstead capable of developing into a first class port; Endeavour Strait, between Cape York and Prince of Wales Island at the extreme north; and a series of prominent headlands separating bays along the east coast. Amongst these are Edgecumbe and Repulse Bays, creating, with Gloucester and

FIG. 294.—*The Great Barrier Reef.*

Cumberland Islands, the beautiful scenery of Whitsunday Passage; Capes Palmerston and Townsend, enclosing two spacious estuaries, Broadsound and Shoalwater Bay; Keppel Bay, with Cape Capricorn on Curtis Island, almost on the tropic; Port Curtis, one of the best harbours on the Pacific coast; and Moreton Bay, partly sheltered by Moreton and Stradbroke Islands.

Configuration and Rivers.—The "Great Divide," receding from the Pacific shore and striking north-west to the 18th parallel as it passes into Queensland from the south, secures for that province a more diversified surface and ampler distribution of water channels than Australia, as a whole, enjoys. The main axis of the water-parting throws off to right and left numerous spurs of considerable length, trending north-east towards the coast and south-west inland. Most of these branch into secondary spurs of equal or greater height, which on the seaward slope, averaging some 300 miles in width, give rise to a number of well-defined river systems, of which the Brisbane, Burnett, Fitzroy, Burdekin, Herbert, Normanby, and Kennedy are the chief. On the landward, or south-western slope, the great tributaries of the Murray-Darling basin, together with numerous feeders of inland drainage systems, flow south-west or south to their respective points of absorption. The Carpentarian Plain, with the western slope of the Cape York Peninsula, forms a distinct system draining into the gulf; the principal effluents being the Leichardt, Flinders, Gilbert, and Mitchell.

Geology.—Geologically, Queensland presents three parallel belts, traversing the territory from south-east to north-west, in accordance with the general strike of the Pacific coast. The most westerly, of Cretaceous origin, but surrounding a large wedge-shaped *enclave* of metamorphic rocks, covers about two-fifths of the territory. It includes the Blythesdale Braystones, an older stratum of the same series, and a prolific source of artesian water. The second belt, on the western slopes of the Great Divide and extending to Cape York, consists of sandstones of later, mostly Tertiary, age, with patches of intrusive crystalline and volcanic rocks. The third belt, comprising the rest of the province, exhibits the Primary rocks (granitic, Silurian, Devonian, Permian, and crystalline) characteristic of the Australian Cordillera, with extensive Jurassic and Carboniferous areas, where coal-seams of excellent quality are worked. Gold-bearing quartz reefs and other mineral lodes are widely disseminated.

Climate.—Although Queensland is not exempt from the climatic vicissitudes to which all Australia is liable, their effects are less marked than elsewhere. The extreme heat, fiery winds, rapid thermal changes, and bitter frosts common in the south and centre of the continent are almost unknown. Even in the hot and dry south-western region, the temperature rarely rises higher than 95° F., while the Cape York Peninsula—within only 10° to 15° from the equator, enjoys, by reason of its seaboard and towering highlands, a more equable climate than many countries

classed as "temperate." The rainfall is very unequal. Over the Pacific slope it ranges from about 50 inches near the southern border to as much as 100, and even 150 inches about lat. 17°, where the ocean vapours are arrested and condensed by the twin peaks of the Bellenden Ker Mountains, 5,000 feet high. The rainfall of the Carpentarian plain and littoral, depending on the partly spent north-west monsoon, is much less, seldom exceeding 40, and often as low as 20 inches. In the west and south-west it is even more uncertain, some localities getting only 10 to 12 inches per annum, while others, not far off, receive 30 to 40. In all parts of the colony droughts of greater or less duration occur at times, and again, the balance may be suddenly restored by widespread and destructive floods.

Flora and Fauna.—The flora, while conforming generally to the Australian type, is enriched by the intrusion of eastern and oceanic forms, giving to the denser forests, or "scrubs," a distinct Indo-Malayan character. Here are found the red cedar, flindersia, alphitonia, hoop pine, and other excellent timbers, intermingled with a dense growth of palms, bamboo and lawyer canes, caper shrubs, tree-ferns, orchids, and countless climbing or parasitic plants. Several of the most striking and valuable trees, such as the Bidwill pine, "turpentine," "silky oak," bottle tree, kauri pine, Leichardt tree, calophyllum and "Queensland nut" are strangely limited in their habitat; hence, some are on the verge of extinction as members of the wild flora. There are at least two indigenous species of banana, two of the *citrus* tribe, many edible figs, well-flavoured wild grapes, a mangosteen, cashew and other nuts, the "Herbert-cherry" (*antidesma*), the "sour plum" (*owenia*), nonda (*parinarium*), jujubes, raspberries, and other fruits. Hundreds of square miles are covered with wild rice, tobacco, indigo, "salt-bush," "Mitchell grass," and similar valuable herbs; screw-pines and mangroves fringe the coast, while the inland pools are gay with the fragrant red chalices of the "sacred lotus," or the blue, white, or purple petals of various nymphæas.

The native fauna comprises most of the common Australian species, besides some peculiar to the region. Such are the tree-kangaroo (*dendrolagus*), the five-toed kangaroo-rat (*hypsiprymnodon*), and several phalangers. The dugong (*halicore*), a marine Sirenian, frequents the weedy estuaries and bays on the coast. Fruit-bats (*pteropus; harpyia; carponycteris*) are a great plague, and, like that greater plague, the imported rabbit, seem to be on the increase. Among the birds typical of this region are the pelican, jacana, regent-bird, bronze-winged and nutmeg pigeon, jabiru, and cassowary. There are two species of crocodile, and snakes (venomous and otherwise) abound. The lung-fish (*ceratodus*) is confined to the rivers Mary and Burnett; the highly-prized barramundi (*osteoglossum*) to the Burnett, Dawson, and Carpentarian river-system. Turtles of fine quality are caught off the coast, where the shallows swarm with edible and pearl oysters, sea-slugs (*holothuria*), sponges, corals, and other forms of marine life.

Aborigines.—The aborigines of north-eastern Australia differ but slightly from their brethren in other regions, save in being taller and more muscular; an advantage attributable to the ampler food supplies and other more favourable natural conditions. They show some skill in the construction of their winter huts, canoes, weapons, implements for gathering and dressing food, woven bags and baskets (frequently watertight), necklaces and other personal ornaments; and, when first met with, had evidently taken a step or two on the ascending plane, which, in the course of ages, might have led them on to civilisation. Many of the strongest and fiercest tribes are now extinct, or represented only by a surviving handful, the whole number probably not exceeding 20,000 (1898).

History and Government.—The territory now known as Queensland was discovered by Captain Cook in 1770. For fifty years it remained unvisited, save by runaway convicts, until in 1825–6, a branch penal establishment, subordinate to Sydney, was founded at Brisbane, Moreton Bay. The dependency was first thrown open to free settlement in 1842, between which date and 1861, when the first census was taken, the population, originally insignificant, increased to 30,000. Separation from New South Wales was effected, after years of agitation, in 1859. For a long time afterwards, the cost of immigration from England, Germany, and other European countries was defrayed by the State. At present Asiatic and Pacific sources are being tapped in order to meet the demand for low-priced labour. As a result, the population is more mixed than in any other Australian province.

FIG 295.—*The Badge of Queensland.*

The government is of the "responsible" pattern, and differs from that of the United Kingdom chiefly in the wider suffrage, in payment of an annual allowance of $1,500 to each elected member of the legislature, and in the functions of Grand Jury devolving on the Attorney-General. There is a Governor appointed by the Crown, a nominee Legislative Council of indeterminate number—usually about 35—and a Legislative Assembly of 72 members, elected by 61 constituencies. Primary education, free, secular, and (nominally) compulsory, is under the care of the State. Higher education is imparted in ten grammar schools, governed by elective trusts, and liberally subsidised by Government. There are also ten "orphanages" under Government inspection, and maintained chiefly from State funds.

Resources, Industries and Trade.—Amongst the resources of Queensland, pastoral wealth—such as wool, hides, meat and tallow—stands first, closely followed by the yield from the many rich gold, coal and tin-fields; silver, copper and other mines. The chief agricultural products are sugar and rum; maize, wheat, rice; sorghum, guinea-grass; wine, arrowroot, bananas, sweet potatoes, tobacco, coffee, cotton; oranges, pine-apples and other tropical and European fruits. The forests abound in

cedar, pine and other useful timbers, and a large fleet of vessels find employment in the pearl-shell, trepang, oyster, turtle and dugong fisheries.

In 1896–7 pastoral leases covered nearly two-thirds of the whole surface, whence live stock, hides, horns and bone-dust; frozen, preserved and salted meat; tallow, and wool were exported to the value of three-fifths of the total exports. The mining industry, pursued on twenty-two proclaimed gold, silver, copper and tin-fields, was accountable for nearly two-thirds of the balance. The value of agricultural exports—sugar, fruit, molasses, maize, arrowroot, rum, hay, wine, was about one-tenth of the whole. Manufactures, in the ordinary sense of the term, are limited to the supply of home requirements. Sugar factories, saw-mills, flour-mills, breweries, and co-operative cheese and butter factories are the most important. All the towns above the status of mere villages are lighted either by gas or electricity, and supplied with water by pressure through service pipes. Boring artesian wells, to supplement the scanty rainfall of the far west, is being carried on with satisfactory results; 341 water-yielding bores in 1898 sufficed by their surplus supply to convert many water-courses formerly dry into permanent streams. This yield, which is steadily increasing, already equals in irrigating effect a yearly rainfall of 12 inches over 108,500 square miles.

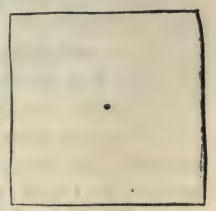

FIG 296.—*The average population of a square mile of Queensland.*

Communications.—In addition to steamers that ply regularly along the coast, internal traffic is promoted by more than 2,500 miles of State railways (Fig. 293). Of the four main lines, the Southern and Western connects Brisbane with Sydney on the one hand and with Charleville and Cunnamulla on the other; the North Coast Line connects Brisbane with Gladstone, by way of Gympie, Maryborough and Bundaberg; the Central extends from Rockhampton to the river Thompson; and the Northern, from Townsville to Hughenden and Winton. Numerous branches assist the traffic along these routes, while shorter detached lines connect Mackay with the surrounding villages; Bowen with the Burdekin delta; Croydon (gold-field) with Normanton, on the Gulf of Carpentaria; Cairns with the table-land of Cape York Peninsula, and Cooktown with the Palmer gold-field. Numerous coaches ply to and from all terminal stations, connecting with places outside the railway system. The postal and telegraph arrangements are very complete.

Divisions and Towns.—For administrative purposes Queensland is divided into twelve districts; numerous counties (which are added to from time to time); about 120 divisional boards and six shires for local taxation and improvement; together with a still larger number of parishes, which ill-chosen term refers solely to land survey and not to any scheme of ecclesiastical rule. Thirty-one of the centres of population, mostly mere villages, are under municipal government.

The coast-line is dotted with harbours, most of which are becoming active industrial and commercial centres. *Brisbane*, on a river of the same name, and the seat of government, owes its growth chiefly to that circumstance, to the proximity of the rich pastoral and agricultural lands of Darling Downs, and to lavish expenditure on the legislature and civil service. The site of the city is low and exposed to floods, and the twenty miles of river that form its port are kept open for over-sea vessels only by incessant dredging. Ambitious public buildings, planned on a scale out of proportion to present needs or means, overlook the leading thoroughfares. Well-kept botanic gardens, acclimatisation grounds, museums, libraries, schools of arts, an art gallery, a technical college, and numerous scientific and other societies make for the "gentle life"; while the infirm and aged poor find a comfortable retreat in the asylum at Dunwich, a beautifully-wooded island in Moreton Bay. St. Helena, another of the same group, is the enforced abode of Queensland's felonry.

Northward along the coast follow in succession: *Maryborough*, on a bend of the river Mary, twenty miles from Hervey Bay, with large foundries, saw-mills, cane and orange cultivation, and the shipping port for the Wide Bay district and Gympie goldfield; *Bundaberg*, near the mouth of the Burnett, on the edge of a large area of rich volcanic soil, a community wholly given over to the manufacture of sugar; *Gladstone*, with its splendid deep sea harbour, Port Curtis—in 1847 the scene of an abortive attempt to found a colony provisionally named North Australia—the outlet of a large mineral district, and one of the few places on the coast adapted for embarking horned cattle; *Rockhampton*, the destined capital of central Queensland, the main outlet for wool and other pastoral produce, and the gate leading to Mount Morgan, the richest gold mine in the world. Then, *longo intervallo*, come *Mackay*, another sugar town; *Bowen*, renowned for its harbour and the length of its jetty, but unfavourably placed for inland traffic; *Townsville*, the principal shipping port of northern Queensland, and connected by rail with the gold-fields of Ravenswood, Charters Towers, and Cape River; *Cairns*, where the teeming jungle soil yields rice, coffee, sugar, cacao, and other tropical crops in perfection, while a railway, that ranks as the boldest engineering feat ever attempted in Australia, leads towards the rich mineral fields of Herberton, Chillagoe and Etheridge. The most northern settlement on the Pacific coast is *Cooktown*, on the Endeavour River, where Captain Cook careened and repaired his ship. It is connected with the Palmer gold-field by a railway 31 miles in length.

Thursday Island, about 30 miles north-west from Cape York, is a fortified imperial coaling-station, the headquarters of the pearl-shell fishery, and a place of call for the Indo-European mail steamers.

The most northerly inland town is *Charters Towers*, the leading goldfield; others are: *Gympie*, on the site of an earlier gold discovery, and

rivalling the former in importance; *Ipswich*, at the confluence of the rivers Bremer and Brisbane, the oldest inland settlement, with woollen and cotton factories and adjacent coal mines; *Toowoomba* and *Warwick*, much frequented sanatoria, 2,000 and 1,500 feet above sea-level, and prosperous seats of that agricultural industry (principally concerned with wheat cultivation) which flourishes on the rich, black loam of Darling Downs; *Mount Morgan*, with its "mountain of gold," which has paid four and a half million sterling in dividends since its discovery in 1885; and numerous other centres of less note.

STATISTICS.

	1881.	1891.	1901.
Area of Queensland (square miles)	668,497 ..	668,497 ..	668,497
Population of Queensland (excluding aborigines) ..	213,525 ..	393,718 ..	503,266
Density of population per square mile	0·34 ..	0·71 ..	0·75

POPULATION OF CHIEF TOWNS.

	1881.	1891.	1901.		1881.	1891.	1901.
Brisbane (10-mile radius)	36,169[1]	101,554	119,428	Ipswich	7,576	7,625	15,246
Charters Towers ..	4,385	4,597	20,976	Gympie	7,659	8,450	14,431
Rockhampton	12,412	13,380	19,691	Toowoomba	6,270	7,007	14,087
Townsville	7,860	8,564	15,506	Maryborough	8,700	9,281	12,900

ANNUAL TRADE OF QUEENSLAND (*in pounds sterling*).

	Average 1871–75.	1881–85.	1891–95.
Imports	2,596,000 ..	5,888,000 ..	4,875,000
Exports	3,583,000 ..	4,056,000 ..	9,028,000

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R. Semon. "Im Australischem Busch und an den Küsten des Korallenmeeres." Leipzig, 1896. (Translation, London, 1899.)
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II.—NEW SOUTH WALES

By Edward A. Petherick.

Position and Extent.—New South Wales, the oldest of the Australian colonies, originally comprehended the eastern half of the continent, and the jurisdiction of the earlier governors extended also over Tasmania, New Zealand, and other islands of the Pacific. Since the foundation of the province of South Australia in 1836, and the erection into separate colonies of Victoria in 1851 and Queensland in 1859, the boundaries of New South Wales have been roughly within 28° and 37½° S., and 141° and 153° E., and its area a little over 310,000 square miles. The frontage to the Pacific Ocean, including the inlets of Port Jackson, Botany Bay, Port Hunter (or Newcastle), Port Stephens and Twofold Bay, is over 800 miles.

Configuration of Coastal District.—The Great Dividing Range or Cordillera of Australia, which extends from Cape York to Wilson's Promontory, passes through New South Wales in broken ranges at a

[1] Without suburbs.

distance of 30 to 120 miles from the sea, and with an elevation of 4,000 to 7,000 feet. West of Sydney, where they present a precipitous barrier, and are composed of horizontally stratified sandstone, broken by canyons, deep gullies, and chasms due to aqueous erosion, they are called, from their appearance, the Blue Mountains. The more northerly are known as the New England and Liverpool Ranges, and those to the south as the Cullarin, Gourock, Manaro, and Muniong Ranges, the last-named forming part of the Australian Alps, their highest point being Mount Kosciusko (7,336), 700 feet above the limit of perpetual snow, and the loftiest peak on the continent. The coastal district on the eastern slope of these ranges is about 50,000 square miles in area and very fertile, being watered by a number of rivers, nearly all of which are navigable for a considerable distance from the sea. From the valleys of the Alps the Snowy river makes a circuitous course and passes southward to the ocean, through the Gippsland district of Victoria.

Configuration of the Interior.—Behind the Cordillera, which presents its abrupt front to the ocean, broad, elevated tablelands and undulating plains form the chief pastoral districts of the colony. The northern plateau is drained by tributaries of the Darling or Barwan, which also receives streams from the south of Queensland. With these waters the Darling is navigable in rainy seasons for 1,700 miles. The southern plateau is drained by the Murrumbidgee, which rises in the Australian Alps and is navigable for 500 miles, the Lachlan, its tributary, and a number of smaller streams traversing the Riverina District. These, as well as the waters of the Darling, flow to the Murray, which is the only outlet for a drainage-area of over 300,000 square miles. It is a land of drought and flood, for all the rivers mentioned, except the Murray, which is fed by the snows of the Alps, stop running in dry seasons ; and in very wet seasons the lower lands of the far interior are inundated for weeks. West of the Darling, and on the South Australian border, the Grey and Stanley or Barrier Ranges rise from 1,000 to 2,000 feet. The streams flowing from them are soon lost in the desert. The only lake of importance in New South Wales is Lake George, 25 miles long and 8 miles broad, situated in the southern ranges, 2,100 feet above sea-level. It is salt, and for a long period before 1852 its bed was quite dry.

Climate.—The climate naturally varies according to locality. The northern part of the coastal district is dry and sub-tropical, the central and southern parts more temperate. The air is clear and the sky generally cloudless. At Sydney, though occasionally rising above 100° in the shade, the mean temperature is 63° ; snow is unknown and frost never severe (Fig. 291). At Albury on the upper Murray, at Deniliquin in the Riverina District, and at Bourke on the Darling, the range is greater, winter being much colder and summer much hotter. The extreme of heat is felt inland, where temperatures of 130° in the shade have been reported. Hot winds accompanied by dust blow during the height of summer, but they are not unhealthy.

In the coastal district the rainfall varies from 30 inches in the south to 73 in the north, the average at Sydney being 50 inches. In the highlands on the Queensland border it is 35, at Deniliquin 17, at Wentworth, the junction of the Darling and the Murray, the lowest part of the interior of the colony, it is 12, and in the Barrier ranges on the west only 9.

Flora.—Open forests cover nearly the whole of the tablelands and interior plains, the characteristic tree being the eucalyptus in its many varieties. The plains west of the Darling and on the lower Murray are covered with stunted bushes or *mallee* scrub. A considerable portion of the coastal district is covered with brush forests, the valleys being filled with tree-ferns, a red and white cedar, silky oak, tulip-wood, a lofty ash, colonial pine, and other timber trees. Economic plants are very numerous; their productions include oils, perfumes, drugs, dyes, tans, fibres, gums, and resins. There are many useful and some noxious grasses. European trees and the beautiful Norfolk Island pine have been acclimatised, while European plants and flowers bloom all the year round. Unfortunately, imported briars, burrs, and thistles have spread all over the country.

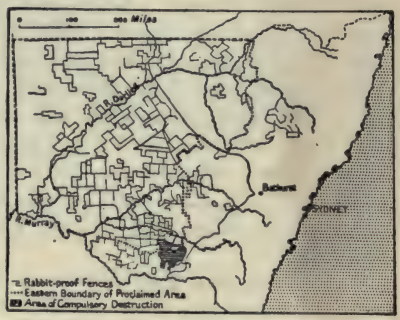

FIG. 297.—*The rabbit-proof fences of New South Wales.*

Fauna.—The indigenous animals of New South Wales are the egg-laying monotremes—the platypus and native porcupines (*echidna*); marsupials—including several varieties of kangaroo, "opossums," native bear, wombats, bandicoots, native cat, several species of rodents, insectivorous bats, and the flying fox. Sperm and whalebone whales, other cetacea, and seals are found off the coast. Snakes, harmless and venomous, are numerous, and so are lizards (including iguanas six feet in length), tortoises, tree and swamp frogs. Birds exist in extraordinary variety and are notable for plumage, song and powers of mimicry. They include birds of prey, cockatoos, parrots, parroquets, and lories; the "laughing jackass," and other kingfishers; the beautiful lyre and bower birds, ground-thrushes, doves, wood-pigeons, numerous game birds, and one of the largest of running birds, the emu, which being treated as a noxious animal, like the kangaroo, native dog, "opossum," and rabbit, is rapidly becoming extinct. The multiplication of the common rabbit has seriously affected pastoral pursuits in many districts, and 17,000 miles of rabbit-proof fencing have been erected in the effort to subdue the pest. The whole western frontier is fenced in this way. The camel has been acclimatised in the Darling districts. Over 300 species of fish (of which more than 100 are edible) are found in the rivers and on the coast.

Aborigines.—Although the aborigines were estimated at one million when the colony was founded, probably their number never exceeded five hundred thousand on the whole continent, and in New South Wales they now number about 7,000, of whom 3,000 are half-castes. Low in the present scale of humanity, some of their usages and customs seem to imply a higher origin or the adoption at some distant period of usages and customs of a superior race, perhaps castaways or shipwrecked survivors from another continent. Internal quarrels, the loss of their natural food and their destruction by firearms or adoption of the vices of the European, have been the chief causes of their rapidly diminishing numbers, and the race is now fast fading away.

Resources.—Though New South Wales is very rich and varied in its mineral wealth, the chief resources are wool and other animal products. Of wool, over 200,000,000 lbs. are annually exported, but owing to drought this is less than in the early nineties; some flocks number over 100,000 sheep, chiefly merinos. Silver and gold, tin, copper, iron, and many precious stones are found. Coal is abundant in the coastal districts, especially at Newcastle, Illawarra, and Lithgow, the annual output being 5,500,000 tons; that from Newcastle alone exceeding 3,000,000, and the seams now being worked are calculated to be sufficient to keep up the present rate of production for 500 years. Manufactures are numerous, but not at present sufficient for home supply. Breweries, meat-preserving factories, boiling-down and wool-washing establishments employ over 50,000 hands. Most of the trade is with the United Kingdom and British possessions.

Discovery and Exploration.—The coast of New South Wales may have been seen by Spanish vessels as early as the middle of the sixteenth century, but from the time of Mendaña's discovery of the Solomon Islands in 1568, the voyage of Torres in 1606, and that of Tasman in 1642, no European vessel is known to have been in the sea between New Zealand and Australia until Cook crossed it and came upon the Australian coast in 1770. He surveyed the whole of the eastern coast, took possession, and named it New South Wales. Several attempts to scale the perpendicular cliffs of the Blue Mountains were made, but no one effected their passage until 1813, when they were crossed by Wentworth, Blaxland, and Lawson, who discovered the extensive tablelands at their summit. Evans and Oxley continued the exploration, discovering the Macquarie in 1815, the Lachlan and Castlereagh, Liverpool Plains, and another passage to the north near Port Macquarie during 1817 and 1818. Several expeditions were undertaken into new country to the south during the following five years. Hume and Hovell crossed the Murray and some of its upper tributaries and reached the sea at Port Phillip in 1824 and 1825. The northern tablelands, including the Darling Downs, the rivers Dumaresq, Gwydir, and Condamine, were discovered by Allan Cunningham in 1827. Sturt traced the Lachlan and the Murrumbidgee to the

Murray, and the Murray to the sea in 1829 and 1830, and Mitchell completed the solution of the problem of the river system west of the Great Dividing Range by tracing the courses of the rivers discovered by Oxley and Cunningham to the Darling, and the waters of the Darling to the Murray, between the years 1831 and 1836. The country and ranges to the west of the Darling, Cooper Creek, and the desert beyond in the heart of the continent, were explored by Sturt in 1844 and 1845, himself and party suffering terribly from heat and thirst.

Settlement and History.—New South Wales was founded as a penal colony for the relief of English prisons and hulks as far from civilising influences as it was possible to go, and the first twenty years of its history is a record of hardship, famine and deprivation. The first fleet under Governor Phillip arrived in Botany Bay January 20, 1788, but finding a more suitable position for a settlement at Port Jackson, landed there on the 26th of January. The transported people were for many years utterly dependent for food and other necessaries upon supplies sent intermittently and irregularly from the other side of the world, at a time when voyages each way averaged seven months in duration. Disheartening calamities also came upon the few free settlers farming the banks of the Hawkesbury; several times their homesteads and produce were swept away by floods.

Under the early governors who, as a rule, were naval officers absolute and arbitrary in the exercise of their power, the military officers secured the monopoly of all trade, including that in spirits. Governor Bligh, already noted in the eventful history of the *Bounty*, having stopped this trade, and quarrelled with Macarthur (who was engaged in laying the foundation of Australia's future industry by importing the finest breeds of merino sheep), the military party arrested and shipped him out of the country. This ended the quarter-deck government and brought about a change in the policy as well as in the character of the governors. After an interregnum of two years General Lachlan Macquarie, the next governor, laid out Sydney and other towns, made roads across the mountains, erected public buildings, encouraged exploration, and took a paternal interest in the settlers. At the end of his twelve years' administration the colony was prosperous and flourishing. The population then numbered 40,000, more than half being free or emancipated persons. A measure of representative government was conceded about 1825 in the shape of a legislative council of nominated members. After ten years' fierce agitation transportation to this colony ceased in 1839. The next twelve years is a record of the extension of legislative privileges—representative and municipal government having been introduced in 1842—of considerable progress in pastoral, grazing, and agricultural pursuits, unfortunately marked by much speculation in land and live stock; this, and the cessation of imperial expenditure for transportation, and the cost of free labour, caused a financial

collapse, the country being saved from ruin by the introduction of a new industry, tallow production by the "boiling-down" process.

The districts south of the Murray were separated as the colony of Victoria at the beginning of 1851, and a few weeks later by the gold discoveries in the Bathurst District, New South Wales emerged from the purely pastoral state into a vigorous national existence, stimulating industrial enterprise, claiming constitutional rights, and receiving responsible government in 1855. From the time of the arbitrary governors the public affairs of the colony had been administered nominally under successive Ministers of the Crown (in reality under the control and direction of irresponsible officials) in London. The Moreton Bay district and territory to the north was constituted a separate colony under the name of Queensland at the end of 1859, leaving the older colony her present territory and a population of 300,000. Thenceforward the material progress of New South Wales, though for a time out-distanced by that of Victoria, has been steady and continuous, and she stands once more at the head of her sister States in population as well as in material wealth and its attendant advantages.

Government.—There are two Houses of Parliament and an executive chosen and presided over by the Governor, who is appointed by the Queen, the depository of the prerogative of mercy within the colony, and who also nominates the members of the Upper House or Legislative Council, assents to or vetoes Bills or reserves them for consideration of the sovereign, as he may be advised by the law officers of the Crown. The Governor of New South Wales is Commander-in-chief of the armed forces of the colony, and was, prior to 1855, "Governor-in-chief," or "Governor-General" of all the Australian colonies. The members of the Upper House hold their seats for life; members of the Lower House or Legislative Assembly are elected by manhood suffrage, and by ballot; parliaments are triennial and the members are paid. For political and territorial purposes the colony is at present divided into 141 counties. Three-fifths of the population is under municipal government. The administration of justice, as in the other Australian colonies, is similar to that of England, local enactments being founded upon the laws of the mother country. There is no established church; primary education is compulsory, and free to children of parents unable to pay school fees. There are numerous technical schools and workshops, libraries and schools of art, agriculture and engineering, grammar and high schools, and a university in Sydney founded upon the model of University College, London.

FIG. 298.—*The Badge of New South Wales.*

Railways and Communications.—A network of good coach-roads covers the settled districts; the telegraph penetrates to all occupied territory, and four trunk lines of railway with their branches, bring the most important, and some of the more distant towns, into daily communi-

cation with the capital, which is also connected by direct lines with Brisbane, Melbourne, and Adelaide (Fig. 293). Several great engineering efforts have been necessary in the accomplishment of these public works, notably the bridges over the Hawkesbury and Murrumbidgee, and most important of all, the zigzag line over the summit of the Blue Mountains.

FIG. 299.—*Average population of a square mile of New South Wales.*

Towns.—There are 188 boroughs and municipal districts outside the metropolis, but most of these are small towns; the only one at the census of 1901 which could boast of a population exceeding 20,000 being Broken Hill.

Sydney, the capital and the oldest city in Australia, founded in 1788, on one of the coves of Port Jackson, now spreads over both the northern and southern shores of that capacious, land-locked, and sheltered harbour, which with its bays and coves possesses a deep-water frontage of over one hundred miles. There is ample anchorage for fleets, and large vessels are accommodated at the wharves and quays of the city proper, which is four miles from the mouth of the harbour. Sydney is the present terminus for all mail steamers between Europe and Australia; excursion steamers and ferry-boats ply to all the marine suburbs, and the port is generally crowded with coasting vessels and steamers trading to other Australasian ports and to the Pacific Islands. From the fact that Sydney is circumscribed by bays and promontories, the streets present an old-world aspect; it possesses noble public buildings, cathedrals, and churches, colossal warehouses, and very fine shops, and the residential suburbs are as a rule well built, the older buildings giving place to new and substantial edifices, while the shores of the harbour become more and more picturesque with the addition of villas and mansions and private and public gardens. Government House is situated in a princely domain overlooking Farm Cove, in which a man-of-war usually lies at anchor, and adjoining the oldest botanical garden in Australia. Centennial Park lies on the south side of the city. The National Park, a few miles further south, contains 35,000 acres of the loveliest woodland, forest, mountain, and river scenery, and has a frontage

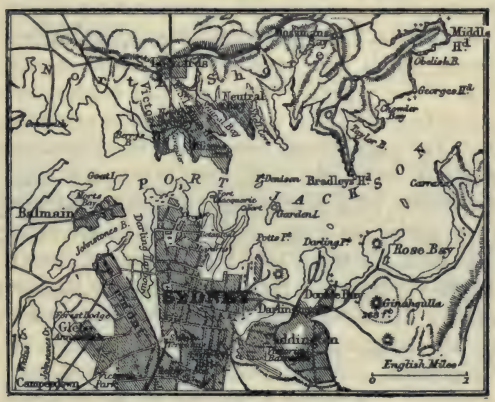

FIG. 300.—*The Site of Sydney.*

of eight miles to the Pacific Ocean. One hundred miles west of Sydney, in a deep valley of the Blue Mountains, are the marvellous limestone Jenolan caves, as yet but partially explored.

Parramatta, literally "head of the waters," is at the head of the harbour, fourteen miles from the capital. It is the next oldest town in the colony, and, being extensively planted with oaks and other English trees, it is essentially English in its appearance. It possesses orchards and orangeries, which have a world-wide reputation, public buildings, residences of Sydney merchants, and the homes of many old colonial families. A few miles to the south, connected by a tramway with the main Southern line, are the small towns of Camden, Campbelltown, and Narellan, on the Nepean river, important only from their situation in the midst of the estates of the Macarthurs, Macleays, Cowpers, and other founders of Australian wealth and prosperity. *Goulburn*, 134 miles south-west of Sydney, on the main Southern line, and 2,070 feet above sea-level, is the centre of the southern inland trade. *Wagga-Wagga*, on the same line, and on the Murrumbidgee river, is the most important town of the Upper Riverina District. *Albury*, sometimes styled "the Federal City," is on the north bank of the upper Murray, and the station where trains are changed for Melbourne. *Newcastle*, the principal seaport town north of Sydney, distant therefrom 62 miles by water and 102 miles by rail, is the greatest coal-mining centre of the southern hemisphere, and the outlet for the agricultural produce of the Hunter river district. In addition to its coal industry, which employs nearly 10,000 men, the town contains several factories and smelting works. Twenty miles up the river, which is so far navigable, lies *Maitland*, a town of enterprising citizens, possessing fine public buildings, churches, schools, and factories. The town, known as East and West Maitland, suffered formerly from disastrous floods, but is now protected by stone embankments. There are coal mines in the vicinity. *Grafton*, chief town of the Clarence river district, 45 miles from the sea, has a large shipping trade, is the centre of a rich agricultural district, and near mines of copper and antimony. *Tamworth*, on the Peel river, 160 miles from Maitland and 280 from Sydney; *Armidale*, the centre of a gold-mining, pastoral, and agricultural district, over 3,300 feet above sea-level; and *Tenterfield*, are rising and important towns on the Great Northern line, the last-named close to the Queensland border. On the Western and North-Western line *Bathurst* stands 144 miles west of Sydney. It was founded in 1815, well laid out with broad streets, and now has fine buildings, factories, railway workshops. It is the centre of an agricultural, pastoral, and gold-mining district. *Orange*, 190 miles west of Sydney, and nearly 3,000 feet above sea-level. has a bracing climate, produces late fruit and the finest wheat. The railway terminates at *Bourke*, on the Darling, 503 miles from Sydney. Lower down the Darling are *Wilcannia* and *Wentworth;* the latter, at the junction of the Murray, has a large river trade. *Hay*, on the lower Murrumbidgee, and *Deniliquin*, on the Edward river, are the chief towns

in the Western Riverina District; the latter is connected by railway with Echuca and Melbourne, and most of the trade with the Riverina District, therefore, passes through Victoria. *Silverton* and *Broken Hill*, towns in the Barrier Ranges silver-mining district, 800 miles west of Sydney and close to the South Australian border, are more easily reached by rail from Adelaide.

Dependencies of New South Wales.—Norfolk Island, situated about 29° S. and 168° E., 1,100 miles distant from Sydney, discovered by Captain Cook in 1774, was occasionally used as a penal settlement for reconvicted criminals. The island was annexed to Tasmania in 1844 and again used as a reformatory prison, but in 1855 the establishment was withdrawn, and most of the descendants of the mutineers of the *Bounty* removed thither in 1856, though many returned later to Pitcairn. Since 1865 Norfolk Island has been the headquarters of the Melanesian Mission. The inhabitants, who are lodged in well-built houses, occupy themselves with planting, herding, and whaling, and the island is once more a dependency of New South Wales, with separate laws and regulations. It has a fertile soil, but no good harbour.

Lord Howe Island, a small island situated between Norfolk Island and Sydney in 31½° S. and 159° E., discovered in 1788, and used as a place of call, is at present occupied by a few settlers, who supply vessels, chiefly whalers, with vegetables. A magistrate has been resident on the island since 1879.

STATISTICS.

	1881.	1891.	1901.
Area of New South Wales (square miles)	310,700	310,700	310,700
Population	751,468	1,132,234	1,359,537
Density of population (per square mile)	2	4	4

POPULATION OF CHIEF TOWNS.

	1886.	1896.		1886.	1896.
Sydney and suburbs ..	308,270	410,000	Grafton	4,000	6,000
Newcastle and suburbs ..	19,027	27,000	Orange	3,795	5,850
Broken Hill	—	18,580	Albury	5,000	5,650
Parramatta	10,287	12,500	Tamworth	4,400	5,400
Goulburn	8,343	12,300	Wagga-Wagga	4,000	4,600
Maitland (East and West)	8,910	10,600	Armidale	2,668	4,700
Bathurst	8,810	9,200			

RESOURCES OF THE COLONY IN 1896.

No. of Sheep.	No. of Cattle.	No. of Horses.	Value of Wool.	Value of Gold.	Value of Silver and Silver-lead.	Value of Coal.
48,319,000	2,226,000	510,600	£8,776,000	£1,073,000	£1,785,000	£1,125,000

AVERAGE ANNUAL TRADE (*in pounds sterling*).

	1873–75.	1881–85.	1891–95.
Imports	11,957,000	21,168,000	19,212,000
Exports	12,611,000	17,489,000	22,670,000

STANDARD BOOKS.

T. A. Coghlan. "The Wealth and Progress of New South Wales." Sydney, *Annual.*
Annual Reports published by the Government of New South Wales on the Lands, Railways and Mines.
F. Hutchinson. "New South Wales." Sydney, 1896.

III.—VICTORIA

By Edward A. Petherick.

Position and Extent.—Victoria, the most southerly of the colonies on the Australian mainland, and the latest settled, lies between 34° and 39° S. and 141° and 150° E., having New South Wales on the north, the Province of South Australia on the west, the Southern Ocean, Bass Strait, and the Pacific Ocean on the south. Its greatest length from east to west is 420 miles, its greatest breadth 250 miles, and its area nearly 88,000 square miles, about one-third that of New South Wales, of which it formed part until 1851, or one thirty-fourth part of the whole continent.

Coastal Features.—Two lofty capes, Otway and Wilson Promontory, the latter a granitic mountain peninsula, forming the southernmost point of Australia, project far into Bass Strait, and, with King, Flinders, and other islands, geologically link Tasmania with the continent. The principal inlets on the Victorian side of the Strait are Port Albert, Western Port, and Port Phillip—an almost land-locked bay, 800 square miles in area, off which open Hobson's Bay, the port of Melbourne, and Corio Bay, the port of Geelong (Fig. 304).

Surface and Natural Divisions.—Mountain chains and hilly ranges, forming part of the Great Dividing Range, traverse the country east and west, at a distance of 50 to 70 miles from the sea, throwing out spurs which divide their northern and southern slopes into several basins, known as the Murray (or North-eastern), Gippsland (or Eastern), Loddon (or Northern), Port Phillip (or Central), Wimmera (or North-western), and Portland (or Western) districts. The eastern chains, or Australian Alps, rise to an elevation of over 6,000 feet, amid magnificent scenery. There are evidences of past glaciation, but snow now remains in summer only in sheltered spots on the loftier summits. The highest peaks measured in Victoria are Bogong (6,508 feet), and Feathertop (6,303 feet). Westward the ranges are lower, descending from 4,000 to 2,000 feet. The Murray District, on the northern slopes of the Alps, is drained by the Mitta Mitta, the Ovens, the Goulburn, and other tributaries of the Murray. The southern slopes of the Alps form the Gippsland District, watered by the Margalong or Snowy river, which rises in New South Wales and flows to the sea direct, and a number of smaller streams, which mostly unite and pass to the sea through a chain of tidal lakes. Count Strzelecki, who explored Gippsland in 1840, called it a noble province of arcadian beauty, possessing lofty mountains, magnificent streams, and fertile plains. The Loddon District is so called from the river of that name, which, with the Campaspe and their affluents flow to the Murray from the northern slopes of the Dividing Range and the Pyrenees. The southern slopes of these mountains form the Port Phillip District, drained chiefly by streams which find their way to Port Phillip Bay, the principal river being the

Yarra Yarra. The Wimmera District occupies the north-western part of the colony, mostly flat country covered with stunted bushes or scrub, known as *mallee*. Several streams take their rise on the northern and western slopes of the hills known as the Grampians, the Victoria and Black ranges, but these dry up without reaching the Murray, or lose themselves in salt lakes. The Portland District lying south and west of the last-mentioned ranges is well watered by numerous streams which unite with the Glenelg and other rivers flowing to the sea. This region is volcanic, characterised by numerous detached and isolated hills, from 1,000 to 2,000 feet in height, some showing extinct craters, and there are many salt and fresh lakes. Hills, plains and valleys are well grassed, and are, for sheep pasturage, perhaps the best in the world. Only two of the rivers, the Murray and the Goulburn, are navigable for any distance.

The geological structure of the colony has been indicated in the general chapter on Australia. Palæozoic strata prevail with intrusions of granite and large masses of volcanic rock abounding in minerals. The weathering of these rocks gives rise to a variety of soils adapted for the growth of a wide range of products.

FIG. 301.—*The extinct volcanoes of south-western Victoria.*

Climate.—The climate is more temperate than that of any other part of Australia. The thermometer rises occasionally above 100° in the shade—a dry heat—and may, for a few nights in the year, fall below freezing point, the mean annual temperature over a long series of years being 57°. Spring is marked by sudden changes. In the summer months—December, January and February—hot winds laden with fine dust occasionally blow from the north, but intense heat is succeeded by thunderstorms and refreshing showers. The winter months are June, July and August, but sunshine is rarely absent, the atmosphere usually being as clear as that of Italy. The rainfall varies from 25 to 40 inches in the east and south, and from 14 to 20 in the north-west.

Flora.—Vegetation is sparse in the plains, giving the country a park-like appearance. In the ranges it is more dense and subtropical in its forms, but the predominating feature is the eucalyptus or gum-tree, hard and durable, valuable for making piles, railway sleepers and girders, yet capable of a high polish for cabinet work. In the Gippsland District specimens of immense girth have been measured, 50 to 80 feet in circumference, and also of extraordinary height—considerably over 300 feet—one fallen tree has been estimated at 480 feet. The blue gum, famous for its

medicinal properties, has been acclimatised in malarial districts of the south of Europe, in India, and in California. The consumption of timber for mining purposes has been enormous, yet it is estimated that over six million acres of hardwood trees are yet untouched. Several species of acacia, or wattle, supply bark for tanning purposes. The gullies also abound with a species of fan-palm, and with fern trees of gigantic growth; there are multitudes of smaller ferns, altogether not less than 160 species. The desert tracts and mallee country of the Wimmera District are more or less interspersed with pasture grass and a great variety of salt bushes. Fire, in time of drought, has been a very destructive agent. The ravages in the forests are, however, soon repaired, for Australian vegetation is as remarkable for celerity of growth as for abundance and variety, the eucalyptic species surpassing all other trees in this respect.

Fauna.—The animals of Victoria are similar to those of the adjacent colonies; the dingo and native cat, the only carnivora, are practically exterminated; the kangaroo driven out of the settled districts, and the "opossum," owing to ruthless pursuit for its skin, largely reduced in numbers; the wombat and platypus are now rare. There are many species of lizards; snakes are numerous, but only two or three species are venomous enough to cause death. Of birds, the emu and native companion are also rare, the lyre bird extremely so, but the smaller birds—cockatoos, parrots, parroquets, laughing jackass, snipe and quail are plentiful. Cattle, deer, and sheep, and the Angora goat have been acclimatised; rabbits and sparrows have become pests.

Aborigines.—When the colony was first settled, the aborigines were still in the hunter and fisher state, nomadic, and without habitations. Their numbers were then estimated at from 6,000 to 15,000. Although protected and cared for in villages and reserves, they have dwindled to less than 600. Being very agile, intelligent, and acute in their sense of sight, they were of some service to the early settlers as shepherds, and in the police force.

Resources.—The chief products are wool, the finest brands obtainable in the world being those of Victorian growth, meat, hides, and other products of cattle, grain and breadstuffs, potatoes, timber, bark (for tanning purposes), tobacco, hops, fruit and wine, all of which are exported, as well as live stock, especially horses. Next to wool, gold (after an aggregate yield of the value of £260,000,000) is still the principal product, although the number of miners employed is now under 30,000. Nearly all gold is now passed through the Melbourne mint and the total value exported in sovereigns and half-sovereigns is over £3,000,000 annually. Extensive beds of brown and black coal are now worked in Gippsland; building stone, limestone, and marble exist in large quantities, as well as kaolin and other clays. Fisheries are also an important industry, the principal supplies of fish coming from the Gippsland lakes, Port Albert and Western Port. Fruit of all kinds is largely grown and exported. The manufactures are of importance for home supply in almost all departments, but are not yet

exported to any appreciable extent. The principal imports are gold from the other States (for minting), cottons, woollens and clothing, sugar, tea, coal, iron, and steel. Over 80 per cent. of the total imports come from Great Britain and British possessions, of which in some years more and in some years less than half is from the United Kingdom, India and Hong-kong. The remainder comes from the other Australian States and foreign countries, chiefly the United States and Germany.

Discovery and Exploration.—Part of the south-eastern coast was sighted by Captain Cook in 1770, and Wilson Promontory was probably seen during Cook's second voyage, by his lieutenant, Captain Furneaux, in March, 1773. Ten years after the settlement of Port Jackson, George Bass, exploring the coast southward in a whale boat, rounded Wilson Promontory and entered Western Port, 5th January, 1798. A few months later Flinders and Bass demonstrated the existence of the Strait by circumnavigating Tasmania. The coast west of Cape Otway was discovered by Lieut. Grant in the *Lady Nelson* in 1800, and Lieut. Murray, continuing these explorations in the same vessel, discovered Port Phillip Bay in 1802, entered and took formal possession of it on March 9th. This port was again explored by Flinders in the following month, and a French expedition being then on the coast, the importance of a settlement in the strait was urged upon the Home Government who sent out two transports with convicts, their wives and children, a number of free settlers, and a military detachment under Colonel Collins, in 1803. Collins landed his people on an arid ridge, inside Port Phillip Heads, and finding it unsuitable for a settlement soon removed to the Derwent near the present site of Hobart, Tasmania. For twenty years the shores of Victoria were visited only by whalers and sealers. Again, there were rumours of an intended French occupation, and a military detachment was sent from Sydney to Western Port by sea, and Hume and Hovell undertook an overland journey in 1824–25, but being forced westward by the mountains they came out on the western shores of Port Phillip Bay near Geelong. The Western Port party was soon withdrawn. Ten years later, Mitchell, continuing Sturt's exploration of the river system of eastern Australia, ascertained that the Darling joined the Murray, and crossed the latter into Victoria. The country, which he traversed in two directions, appearing to be more temperate, richer, and more beautiful than any he had seen before, he named it—the better to distinguish it from the parched deserts of the interior—Australia Felix.

Settlement and Growth.—Pasture land being mostly taken up in Tasmania, applications were made as early as 1827 to the Sydney Government for the use of lands at Western Port, but were not granted. Pioneer settlers removed their stock to Portland Bay in 1834, and others crossed to Port Phillip in 1835 and purchased from a number of wandering aborigines a tract of land 600,000 acres in extent, the consideration being an immediate present and a yearly tribute of goods. These proceedings were disallowed,

and the settlers warned that they were trespassers. At the same time their services to the colonisation of the country were recognised, and they, or their heirs, were afterwards compensated. During the year following Mitchell's explorations, a number of squatters on the Sydney side drove their flocks and herds over the Murray, more followed from Tasmania, and the news reaching the mother country, the tide of emigration began to flow towards Port Phillip in 1839.

An arbitrator was chosen from among themselves by the first settlers until a police magistrate was sent to them from Sydney. Governor Bourke visited the settlement in March, 1837, and approved of plans for a town on the Yarra, to be called Melbourne, a second at Geelong, and a third, Williamstown on the harbour, which, having been surveyed by Captain Hobson of H.M.S. *Rattlesnake,* was named Hobson Bay. As inconvenience was caused by the necessity of referring matters to Sydney, a Superintendent was sent out from England in 1839, and provision made for the local administration of justice. Melbourne was declared a free port in 1840 and incorporated a town in 1842. Representative government being conferred on New South Wales in the same year, six members were allotted to the districts south of the Murray, the population of which was 23,000, but the inhabitants desiring the control of their own local affairs petitioned for separation. This, after several years' agitation and a long period of financial trouble, was granted at the beginning of 1851, with a Governor and Legislative Council, composed of elective and nominated members. The discovery of gold in California having drawn away some of the population, and the more recent discovery of gold in New South Wales (February, 1851), threatening to draw away more, a substantial reward was offered for the discovery of a gold-field within the colony. In a few days former "finds" were verified, gold was unearthed in the nearest ranges, and in a short time richer fields were revealed than any previously known. Melbourne was soon emptied of its male inhabitants, and in a few weeks Tasmania and South Australia were largely depleted. By the end of the year immigrants came flocking in from all parts of the world. This influx continued for four years, the arrivals being from one to five thousand weekly, the population increasing (in spite of departures) from 78,000 in 1851 to 400,000 in 1856. A Commission assisted the Governor in Council in controlling the operations on the gold-fields, which soon extended over the greater part of the colony.

FIG. 302.—*The Badge of Victoria showing the constellation of the Southern Cross.*

Government.—Responsible government was conferred upon the colony in 1855 in the form of two Houses of Parliament, the lower house, whose members are paid, being elected by ballot and manhood suffrage, and a Cabinet of Ministers, responsible to Parliament, presided over by a Governor appointed by the Crown. The population as in New South

Wales, is largely concentrated in the capital. From the beginning of the influx of population the government was beset by the difficulty of settling the people upon the unoccupied lands. Acts and regulations more and more favourable to that end continued to be passed ; lands were surveyed expeditiously, and all possible facilities granted. Public works also were undertaken upon an extensive scale—main roads and bridges, railways and telegraphs, waterworks and reservoirs for towns and mining operations as well as harbours and lighthouses—with the result that more than half of the present largely-increased population is now settled in rural districts, 15 per cent. in country towns and not more than one-third in the metropolitan area, which is a very large one. As a further inducement, in recent years, over 150,000 acres have been set aside in eighty-five different localities for homestead and village communities financially assisted by government, and labour colonies are also in operation to fit men for the duties of country life. Irrigation settlements at Mildura, on the lower Murray, have, despite financial difficulties, met with a large measure of success, and shown to what use the waste lands of the "Mallee" country may be turned. National irrigation works in the valleys of the Goulburn and lower Loddon, and storage works at Horsham in the Wimmera District, are entirely under State control, and, like the railways, are the property of the State.

FIG. 303.—*Average population of a square mile of Victoria.*

Primary education is free, unsectarian, and compulsory, free passes on the railways being granted to the children of the scattered settlers. There are many public and private schools of a higher grade, technical colleges, and a university in Melbourne. There is no Established Church.

Towns.—Municipal government having been granted early in the history of the colony local improvements have been carried on simultaneously with national works, with the result that the annual death rate is much below that of any European country, being under fifteen per thousand. Ninety-nine per cent. of the territory is locally governed in 60 urban districts and 150 shires. Besides the capital, eight cities or towns have a population exceeding 25,000 each ; but most of the country towns are small. In addition to public offices, churches, schools, mechanics' institutes, and libraries, a special feature of the principal towns is their parks and recreation grounds. Scattered over the country also are the homesteads and mansions of the squatters and other magnates. A considerable part of the population, as in all young countries, is migratory in its habits; for instance, nearly 100,000 migrated from Victoria to Western Australia and the adjacent colonies during the financial troubles in 1893 and 1894—over 50,000 left Melbourne alone. Some of these have since returned.

Melbourne, the capital, the most populous city in Australasia and the seventh city in order of size in the British Empire, with its suburbs, including Port Melbourne and Williamstown, occupies over 200 square miles. It is situated on the Yarra Yarra and Saltwater rivers, which are crossed by fine bridges. Steamers of 8,000 tons now pass through a new channel from the port to wharves (eight miles in length) in the heart of the city, and a dry dock at Williamstown can accommodate the largest vessels. Ninety per cent. of the imports and exports of the colony passes through Melbourne. The city possesses all the public buildings and commercial facilities of a first-rate European capital and seaport; the houses of parliament, vice-regal residence, university and affiliated colleges, as well as the parks, botanic and zoological gardens, may be particularly mentioned. In picturesqueness of situation and in beauty of architecture—civil, ecclesiastical, and domestic—Melbourne and its suburbs rank with the finest cities of the old world. It has ample water-supply for all purposes, railways and cable-tramways, and a comprehensive scheme of sewerage is approaching completion. There are many favourite resorts of excursionists in the vicinity on the shores of the bay as well as in the nearer mountain ranges, while the "Alps" can be reached by rail in a few hours.

FIG. 304.—*Port Phillip and Melbourne.*

Ballarat, the second city in Victoria and fifth in Australia, 75 miles north-west of Melbourne, stands at an elevation of 1,400 feet above sea-level, and has been for half a century the centre of the richest gold-yielding district in the world. The "Welcome" nugget, weighing 2,217 ounces, was found at Ballarat and sold for £10,500. The city, which is in the midst of agricultural and pastoral districts producing the finest wool, is well laid out, has fine streets and public buildings, and an artificial lake. Six lines of railway branch off to other mining towns in the neighbourhood and all parts of the colony. *Bendigo*, formerly Sandhurst, 100 miles north of Melbourne, is the headquarters of another rich auriferous district, occupying 22 square miles, and containing 700 distinct quartz reefs. This city possesses many fine buildings, a botanic garden, a park, and various factories. *Eaglehawk*, four miles from

Bendigo, contains many rich quartz mines, and is an important town in itself. *Geelong*, situated on the Barwon and Corio Bay, 45 miles south-west of Melbourne, is reached by steamer and rail. It possesses a fine harbour and all the public buildings of a prosperous commercial and manufacturing town. It is the chief seat of the woollen industry in Victoria, and the railway connects it with Colac, Camperdown, Warrnambool, and Port Fairy, passing through the richest pastoral and agricultural districts. *Warrnambool* is a seaport town, having a fine jetty and breakwater. Its chief export is dairy produce, and it possesses many fine buildings and factories, sea-baths, colleges, museums, gardens, and the coolest summer climate in Australia. At *Framlingham*, 18 miles from Warrnambool, the remnant of the Western District aborigines is sheltered. Between Geelong and *Queenscliff*, the pilot-station and the fortified entrance of Port Phillip—also a favourite watering-place—lies the most highly cultivated district in the colony, the formation being sand over clay.

Railways.—The above-mentioned towns are all connected by rail, the lines radiating from Melbourne (Fig. 293). The North-Eastern and Northern Railways tap the Riverina District of New South Wales at seven points on the Murray, the navigable frontage of that river being nearly eight hundred miles. The North-Eastern line for Sydney crosses the river at Wodonga for Albury, but change of carriage is necessary owing to a difference of gauge. The Northern Railway crosses the river, by an iron bridge 2,000 feet long, at *Echuca*, the principal town on the Murray, the *entrepôt* for intercolonial trade, and junction for Deniliquin, the chief town of the Riverina District. Echuca is also the centre of an agricultural and wine-growing district, and possesses immense wool stores and factories. Branches of the same lines touch the river at *Yarrawonga* (where there is another fine bridge), and at other points. There are other important towns in the northern and north-eastern districts rich in cattle, agricultural, and mining products, including *Mooroopna* and *Rutherglen*, centres of the largest wine-producing districts in Australia, and *Beechworth*, a mining centre and picturesque holiday resort, situated 1,770 feet above sea-level. From *Bright*, a small town in the same district, there is an easy ascent to some of the highest peaks of the "Alps." From Ballarat the North-Western trunk line passes through thickly-timbered country to *Ararat*, the centre of a pastoral, agricultural, and wine-making district, and sends branches to the mining town *Stawell* and to *Portland*, the oldest settlement in the colony, situated on the bay of that name, which affords anchorage for the largest vessels, and is the natural outlet for the Western District. From Ararat the main line proceeds to *Horsham*, the chief town of the Wimmera District and a market for live stock, grain and fruit, and thence to Adelaide, crossing the South Australian border at Serviceton, no change of carriage being necessary. The South-Eastern main line from Melbourne passes through the Dandenong State forest and the recently discovered coal districts to *Sale*, the chief town in Gippsland, and to the Gippsland lakes.

STATISTICS.

	1881.	1891.	1901.
Area of Victoria (square miles)	87,884	87,884	87,884
Population	862,346	1,140,405	1,200,914
Density of population (per square mile)	10	13	14

POPULATION OF CHIEF TOWNS.

	1885.	1895.		1885.	1895.
Melbourne and suburbs	345 380	460,371	Warrnambool	5,398	6,600
Ballarat	41,110	46,276	Maryborough	3,800	5,460
Bendigo	36,570	42,000	Stawell	4,900	5,200
Geelong	20,890	25,000	Castlemaine	6,000	5,100
Eaglehawk	7,650	8,476	Echuca	4,065	5,000

RESOURCES OF VICTORIA IN 1896.

No. of Sheep.	No. of Cattle.	No. of Horses.	Value of Gold raised.	Value of Wool.
14,000,000	1,900,000	435,000	£3,220,000	£5,250,000

ANNUAL TRADE OF VICTORIA (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	15,241,000	18,091,000	15,422,000
Exports	14,787,000	16,089,000	14,420,000

STANDARD BOOKS.

J. J. Fenton. "Victorian Year Book." Melbourne, *Annual.*
J. Bonwick. "Port Phillip Settlements." London, 1883.

IV.—TASMANIA

BY THE EDITOR.[1]

Position and Coasts.—Tasmania, the fourth and most southerly Australian colony of the eastern tier, is an island separated from Victoria by Bass Strait (about 140 miles wide), and lying between the parallels of 40¾° and 43½° S. Its area is scarcely less than that of Scotland, and it is the smallest as well as the most temperate of the Australian colonies. The north coast of Tasmania faces the continent in a concave curve from the two ends of which lines of islands, the Furneaux group on the east and Hunter and King Islands on the west, stretch northward across Bass Strait, like chains suspending a heart-shaped pendant. The indentations on the north and west coasts, although affording a few natural harbours—notably the narrow estuary of the Tamar on the north, and Macquarie Harbour on the west—are neither numerous nor important. The east coast is a little more broken ; but in the south-eastern corner the edge of the island is wrought into a singular complex of fantastic peninsulas, amongst which the form of a recurved hook is re-

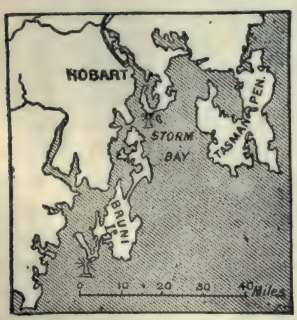

FIG. 305.—*The South-Eastern corner of Tasmania.*

[1] Assisted by E. J. Hastings.

peated again and again on different scales of magnitude. In the heart of this rocky maze the estuary of the Derwent opens, access to it being hampered by many serious dangers before the days of lighthouses.

Configuration and Rivers.—Tasmania is essentially a highland region built up mainly of ancient Palæozoic strata through which harder igneous masses have been intruded. The result of the initial form and the diverse materials is that the full rivers fed by the rain of the "roaring forties" have carved the surface into picturesque gullies and bold mountainous slopes. An irregular range, or series of ranges, runs close along the east coast, rising in Ben Lomond to over 5,000 feet. It consists largely of trap which has broken through the overlying sandstone, limestone, and other strata now found in the valleys and lowlands. Volcanic forces have been active in recent geological time, covering large tracts of the east and centre with lava, which, in decomposing, formed a very fertile soil. West of this mountainous belt, the valleys of the Tamar, Macquarie, and Coal rivers, and connecting lowlands form a line of depression affording means of direct communication between north and south, utilised by the main trunk railway of the island. Farther west, the whole centre is occupied by a plateau much of which exceeds 3,000 feet in elevation, dominated by short mountain ranges and isolated summits, including Mount Cradle (5,070 feet), the culminating point of the island. Bordering the plateau on the south and west there are several ranges of metamorphic rocks rising to a considerable height. The highest part of the plateau in the north-east, not far from the centre of the island, is occupied by a remarkable group of fresh-water lakes, situated in picturesque scenery, and likely to prove one of the most valuable resources of Tasmania by attracting visitors from the mainland colonies in the summer months. Great Lake, the largest, is about twelve miles long and four wide, and is situated at an elevation of 3,800 feet above the sea. The principal rivers are the Derwent, which rises in Lake St. Clair and flows south-eastwards for about 130 miles to Storm Bay; the Huon, about 100 miles in length, flowing through a rich forest region to D'Entrecasteaux Channel; the Tamar in the north, properly an estuary formed by the union of the rivers Esk and Macquarie which drain the great eastern depression, coming from the Eastern Ranges, and receiving tributaries from the central lakes.

Mineral Resources.—Tasmania is rich in minerals. Tin has been the most extensively worked hitherto, the principal mining centres being at Mount Bischoff on the north-west, and at Branxholme in the north-east. Valuable deposits of copper and antimony are being opened up at Mount Lyell, and silver in the vicinity of Mounts Zeehan and Dundas, in the west. Iron is widely distributed, and large beds of coal, some of good quality, are found in different parts; the mines of the Fingal basin in the east supply the Tasmanian railways. Other useful minerals are bismuth ore, slates, marble, and excellent building stone.

Climate, Flora and Fauna.—The climate, on account of the pre-

vailing westerly winds, which moderate the heat, is the mildest and most equable of any part of Australasia and shows well-marked seasons. It resembles that of the south of England ; and, as in the British Islands, it gives a definite character to the land and its productions. The mean temperature in winter on the coast is 47°, and in summer 62° F. ; but in the highlands the winters are more extreme. The rainfall is moderate, but, compared with that of the continent of Australia, ample and uniformly distributed. At Hobart the average is a little less than that of London. The vegetation is mainly of the Australian type, eucalypti being the most widely distributed. One species, known as the Tolasa Blue Gum, is said to attain a height of 350 feet. The Huon Pine is abundant in the south. The island was once almost entirely forest-clad, and large woodlands still remain yielding much valuable timber. The fauna also is, in general, similar to that of the Australian continent, but a few forms are peculiar to the island, the most noteworthy being two species of carnivorous marsupials, the famous Tasmanian devil and the native tiger, or striped wolf, both of which have been hunted almost to extinction by the settlers on account of the destruction they caused to sheep. Of 170 species of Australian birds about 15 are common to Tasmania, including a "reed warbler" and one species of quail as large as a partridge. The platypus is more common in Tasmania than in the Australian continent. Fish of various kinds are abundant, and a very large and much esteemed crayfish is an article of export to the neighbouring colonies.

FIG. 306.—*The Badge of Tasmania.*

History and Government.—Tasmania, or as it was first named Van Diemen's Land, was discovered by Tasman in 1642. Towards the end of the following century it was visited by several navigators, amongst whom was Captain Cook, who landed at Adventure Bay on the south-east coast in 1777, but did not recognise the insularity of Van Diemen's Land, which was not proved until Bass and Flinders circumnavigated it in 1798. In 1803 it was formally taken possession of on behalf of the British Crown, as a dependency of New South Wales, and a small convict settlement was formed at Risdon on the Derwent. This was transferred in the following year to the opposite side of the river, the site of the present capital. The island continued to be a dependency of New South Wales till 1825, when it was constituted a separate colony, but transportation of convicts to Van Diemen's Land continued until 1853. In 1856 the colony was granted responsible government, and the name changed to Tasmania. The Governor represents the Queen ; the Parliament consists of a Legislative Council and a House of Assembly, the members of both being elected.

Aborigines.—The Aborigines, who at the time of the British annexation numbered perhaps 4,000 or 5,000, are now quite extinct. A few half-breeds only remain on the Furneaux Islands. The history of the dealings of the British settlers with the aborigines is deplorable. From 1804, soon

after the planting of the first convict settlement, until 1832, when the natives were almost exterminated, a "Black War" was waged, marked on both sides by cruelty and treachery. In 1830 an attempt was made to drive the surviving inhabitants into a corner of the island, but it utterly failed. Subsequently after five years of effort, marked by countless dangers and hardships, some philanthropic individuals succeeded in gathering the remnant of the race together in Bruni Island, whence they were afterwards removed to other stations, but it was too late, and although considerable attention was paid to the last of the Tasmanians they had dwindled to sixteen in 1850, and the last survivor, an old woman of seventy-three, died in 1876.

FIG. 307.—*Average population of a square mile of Tasmania.*

Industries and Trade.—Sheep-rearing and agriculture are the principal occupations. Besides the crops grown for domestic supply, the most important are fruit and hops. Much attention is devoted to the former, and fruit, both fresh and preserved, constitutes the chief agricultural export. The leading exports are wool, gold, silver and tin, and the imports textiles, various manufactured goods and provisions. The bulk of the trade is carried on with the neighbouring colonies of Victoria and New South Wales, and with the United Kingdom. The main line of railway runs from north to south between Hobart and Launceston, and there are several secondary lines. Coaches connect the principal townships, but facilities for internal communication are, as yet, very limited.

Towns.—*Hobart* (formerly called Hobart Town), is pleasantly situated on the Derwent, on rising ground at the base of Mount Wellington (4,160 feet). The city is well laid out and has various handsome churches and other public buildings. Local industries include flour mills, jam factories, woollen mills, tanneries, and important iron works, where materials for railway and bridge construction and steam machinery are produced. The harbour is spacious, deep and well sheltered. *Launceston*, on the Tamar, is the second town in the colony, and the chief port of the north. It stands in a valley at the head of the estuary, between the Cataract and Windmill Hills; the former takes its name from picturesque falls in Cataract Gorge on the South Esk.

STATISTICS.

	1881.	1891.	1901.
Area of Tasmania (square miles)	26,215	26,215	26,215
Population of Tasmania	115,705	146,667	172,475
Density of population per square mile	4	6	7
Population of Hobart	21,118	24,905	24,654
" Launceston	12,752	17,108	18,022

AVERAGE ANNUAL TRADE OF TASMANIA (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	1,027,000	1,669,000	1,336,000
Exports	911,000	1,533,000	1,400,000

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CHAPTER XXXIII.—CENTRAL AND WESTERN STATES OF THE COMMONWEALTH OF AUSTRALIA

I.—SOUTH AUSTRALIA

By Edward A. Petherick.

Position and Extent.—The Province of South Australia lies between 26° and 38° S. latitude, and 129° and 141° E. longitude, having Western Australia on the west, New South Wales and Victoria on the east, the Southern Ocean on the south, and an area of 380,000 square miles. The territory extending north of the twenty-sixth parallel to the shores of the Indian Ocean, Arafura Sea, and the Gulf of Carpentaria, lying between 129° and 138° E., the boundaries respectively of Western Australia and Queensland, and containing 523,000 square miles, has also been under the administrative control of the South Australian Government since 1863. The "Province" and the "Northern Territory" together are 1,800 miles in length from sea to sea, and in area are three times as large as New South Wales, comprising indeed nearly one-third of the continent.

Coast.—The southern coast is deeply indented by Spencer Gulf, which penetrates nearly 200 miles and includes Ports Lincoln and Augusta, and by St. Vincent Gulf penetrating 100 miles, Yorke Peninsula lying between. Spencer Gulf is bordered on the west by Eyre Peninsula, beyond which comes the Great Australian Bight. To the east of St. Vincent Gulf, Lake Alexandrina forms the outlet of the river Murray, and a remarkable sand-spit runs south-eastward along the coast for nearly 90 miles, locking in a long narrow lagoon—the Coorong—against the land. South of the gulfs is Kangaroo Island, 85 miles long, separated from the mainland by Investigator Strait and Backstairs Passage.

The northern coast comprises the western side of the Gulf of Carpentaria bordered by several islands, and the much-indented north and east coasts of Arnhem Land. Coburg Peninsula and the two islands of Melville and Bathurst enclose a considerable area of water in Van Diemen Gulf, the south coast of which contains the inlet of Port Darwin. Queen's Channel, the estuary of the Victoria river, forms the south-westerly corner of Arnhem Land.

The Interior.—Ranges of hills running northward from Cape Jervis parallel with St. Vincent Gulf—the highest points, Mount Lofty (2,330 feet) and Razorback (2,830 feet)—divide the waters flowing eastward to the Murray and a few streams flowing to the Gulf. This part of the

country is almost wholly arable land. The south-eastern district is largely composed of the same eruptive rocks which occur in the adjoining part of Victoria; the most conspicuous of several ancient volcanoes is Mount Gambier. The Flinders Range runs east and north of Spencer Gulf, and Gawler Range westward, crossing Eyre Peninsula. Beyond are low-lying lands, and Eyre, Gairdner, Torrens, and other salt lakes which in wet seasons receive the waters of a vast extent of back country, including streams from western Queensland. The waters thus received are absorbed or evaporated during seasons of drought, when the interior plains become an arid and burning desert. The surface of Lake Eyre is a few feet below sea-level. Further north, in the centre of the continent, is an elevated tract of country, Larapinta Land, formed by the Macdonnell and James Ranges, composed of rugged and barren rocks nearly 5,000 feet above sea-level. From these ranges occasional heavy rains rush down numerous channels to the Finke (native name, *Larapinta*) river, flooding and fertilising the hot moving sands of the surrounding country, and rapidly producing a luxuriant growth of vegetation. Lake Amadeus lies west of this region and partly within Western Australia. The coastal districts of the Northern Territory are fairly well watered with streams from ranges at no great distance inland, the chief rivers being the Roper, which flows into the Gulf of Carpentaria, the East, North, and South Alligators, the Adelaide, Daly, and the North-Western Victoria flowing into the Indian Ocean.

Climate.—The temperature of the Province varies considerably. At Adelaide, during a long period of years the maximum observed for the month of January (midsummer) was 112°, and the mean day temperature 86°; the maximum for July (midwinter or rainy season) was 69°, and the mean during the day 58°; the minimum observed was 34°. In the Mount Lofty ranges, within an hour's journey of the capital, the temperature is from 10° to 15° lower in summer, and in winter snow sometimes falls. The prevailing winds, except in midsummer, are south-east; in summer they blow from the north, are hot and enervating, especially to those in feeble health, and severe upon tender or unprotected plants. In proof of its general healthfulness it may be noted that the colony has never been visited by any epidemic. South Australia suffers more from drought than the other colonies—serious visitations occurring at intervals of about eleven years; the last was in 1896–97. In Larapinta Land the climate is milder on account of altitude, with warm clear days and bright cold nights with light breezes, hot winds being rare—conditions which have a marked influence on the indigenous life of that region. The average rainfall varies from 13 to 30 inches at Adelaide—mean for 52 years, 21 inches—and from 11 to 5 inches further north and west. In the Northern Territory upon and near the coast which is affected by the monsoons, the mean rainfall is over 50 inches; at Port Darwin it is 63 inches, and the mean annual temperature 82°. At Alice Springs, the central telegraph station, the rainfall is 11 inches and the mean temperature 70°

(Fig. 292); at Port Augusta, head of Spencer Gulf, 9 inches and 66°; at Eucla, on the Australian Bight, 10 inches and 63°.

Flora and Fauna.—South Australia and the Northern Territory, between the northern and southern gulfs, occupy the depressed area once covered by the sea between eastern and western Australia, which were geologically two islands, and its sparse vegetation partakes of the character of both regions. The eucalyptus predominates, though the trees do not grow to the size they reach in the other colonies. Grass trees, with edible roots, and shea oak abound in the south-eastern district; the sandalwood tree on Yorke Peninsula; saltbush in the northern districts, and "scrub" or mallee more or less over the whole Province. The vegetation of the Northern Territory is Australian, though with tropical grasses and sedges, mangroves on the coast, and the paper bark tree, which forms impenetrable thickets for hundreds of miles on the banks of the rivers.

The animals of the Province and the Northern Territory are generally the same as in other parts of Australia except that alligators abound in the northern rivers, and the wombat is found only in the south. Animal life is abundant in Larapinta Land on account of the favourable climatic conditions, and includes a remarkable mole-like marsupial. Among insects, the white ant in the north is very destructive, necessitating the use of iron and steel for telegraph poles and railway sleepers. Seals, once found in great abundance on the shores of Kangaroo Island, are now rare; and the marsupial, which was so numerous when Flinders named the island, has there been long extinct.

Aborigines.—In 1876 the number of aborigines in the Province was under 4,000, in 1891 they had dwindled to about 3,000; the number in the Northern Territory is about 20,000. Those of the extreme north were reported by early explorers to be cannibals, but there is no evidence of this since the settlement of Port Darwin. In Melville Island they are fierce and intractable. The aboriginal of Larapinta Land is described as the living representative of the Stone Age, performing the most daring surgical operations with his flint knives; naked, hairy, merry, a mimic, wonderfully agile, possessing an unerring hand that works in perfect unison with an eye keen as that of an eagle; without habitation, living entirely upon the spoils of the chase; untameable; with no belief except in an evil spirit, or in traditions, he yet practises with scrupulous exactness the most painful and hideous customs, of the origin or reason of which he knows nothing. Adopting the debasing habits of the white man he will soon have passed away.

Discovery and Exploration.—The northern coasts were regularly visited by Malays in search of trepang before the advent of Europeans to the Malay Archipelago at the beginning of the sixteenth century. The first comers were Portuguese, from whose observations early accounts of the country and the inhabitants are no doubt derived. The Dutch

surveyed the same shores during the following century. Ships of the British navy finally took up the work, Flinders in 1803, King in 1820, and Stokes in 1839, when Port Darwin was discovered and named. The Great Australian Bight was sailed along in January, 1627, by a vessel named the *Golden Seahorse*, which carried the Dutch ambassador, Pieter Nuyts, to Japan, hence the name "Nuyts Land." This country being situated in the most favourable degree of south latitude, the Swiss projector, J. P. Purry, proposed to settle it as a vine-growing colony in 1717 and 1718. It does not, however, appear to have been seen again until January, 1793, when D'Entrecasteaux visited the coast in search of La Pérouse. Lieut. Grant, making the first outward voyage through Bass Strait in the *Lady Nelson* in 1800, came upon the coast further east. Flinders discovered Kangaroo Island and completed the survey of the southern coasts in 1802. At Encounter Bay he met and gave copies of his charts to Admiral Baudin, who brought them to Europe where they were published with French nomenclature, Spencer and St. Vincent Gulfs appearing as "Buonaparte" and "Josephine," and the whole country between Nuyts Land and New South Wales as "Terre Napoleon."

Nothing was known of the interior until Sturt sailed down the Murray in 1830, and Adelaide was founded in 1837, when Eyre and others made overland journeys from New South Wales and Port Phillip. In 1841 Eyre, who had, meantime, discovered Lake Torrens, accomplished his more extraordinary journey round the Great Bight to King George Sound. Sturt made his last expedition (in 1844–45) to Cooper Creek (the Victoria of Mitchell) and the great stony desert, whence he was driven back after terrible privation and partial loss of sight. Although exploring journeys were kept up, it was not until 1862 that M'Douall Stuart, in a third attempt, succeeded in crossing the continent to Port Darwin. Burke and Wills's successful exploration, partly through the same territory, to the shores of the Gulf of Carpentaria was accomplished the year before, but they perished at Cooper Creek on their return journey. Exploration in the interior has been continued in private and government expeditions conducted by Warburton, Forrest, Gosse, Giles, Lindsay, Favenc, Tietkins, Carnegie, and others, who have left little of the interior that is quite unknown. Conducted by Winnecke, the Horn Scientific Expedition explored Larapinta Land in 1894.

History and Government.—South Australia was founded by Act of Parliament upon principles advocated by Gibbon Wakefield, whereby revenue from sales of land was to be devoted to the promotion of immigration. The first colonists were sent out in 1836, preceded by a survey party to examine Kangaroo Island, Port Lincoln, and other parts. A site for a town was chosen where Adelaide now stands early in 1837, and town and country lands soon allotted. Divided authority, disputes between the officials and the colonists, and experiments in finance which destroyed the self-supporting character of the colony, led to the

recall of the first two governors, and to the constitution of South Australia as a Crown Colony. The new governor, Sir George Grey, brought the affairs of the colony into shape, though for a time the necessary retrenchments pressed sorely upon the community. The discovery of copper ore in 1843 advanced South Australia upon a career of prosperity and enterprise, interrupted, however, by the gold discoveries in New South Wales and Victoria in 1851, which drew away nearly fifty thousand men and for a time stopped all local trade. Many returned in the following years, and land being cheap, the colony was saved from ruin by the energetic development of its agricultural resources, and the "farinaceous colony," as it was facetiously called, became for a long period the granary of Australia.

FIG. 308.—*The Badge of South Australia.*

Responsible government was conferred upon the colony in 1856. The members of the Upper House or Legislative Council are elected upon a property qualification, those of the Lower House or Assembly by manhood suffrage. South Australian statesmen have led the way in many progressive measures of policy with good effect on the prosperity of the people. Public works and unleased lands are controlled by local authorities. Hydraulic works have made many districts independent of an uncertain rainfall, and artesian wells, sunk in various places, chiefly along the overland line of railway, have conclusively proved the existence of enormous subterranean supplies of water. An irrigation colony, Renmark, similar to that of Mildura, is in operation on the lower Murray. Afforestation is under the direction of an Agricultural Department, and 7,000,000 trees have been planted in the Province since 1876. The chief products are wheat, which is largely exported, and copper, of which over £20,000,000 worth has been raised in the State since 1845; wine is an increasing industry. The total value of exports per head of population is far in excess of that of any other of the Australian States, and the acreage under cultivation exceeds all these colonies with the exception of Victoria. The imports consist chiefly of British manufactured goods. The most important public works yet undertaken have been the transcontinental telegraph, and telegraph lines to the borders (connecting the Australian systems, as well as those of Tasmania and New Zealand, with other parts of the world), and trunk lines of railway to the Murray and Victorian border, to Broken Hill in New South Wales, to Spencer Gulf, and nearly half way across the

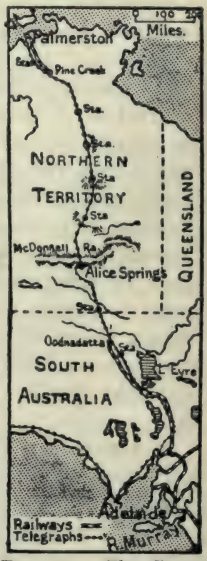

FIG. 309.—*The Transcontinental Telegraph and Railway.*

continent towards Port Darwin. Primary education is compulsory, secular and free ; secondary education is afforded in private establishments, and there are government schools of mines and industry, of painting and design, agricultural colleges and schools, a museum of natural products, botanic garden, libraries, observatory, and university.

Towns.—Essentially an agricultural and pastoral country, the Province of South Australia possesses few towns containing more than five hundred inhabitants, and with the exception of the capital and its suburbs there are only ten with upwards of a thousand. *Adelaide*, the capital, sometimes called the "model Australian city," is well situated on a plateau, on the river Torrens ; it has fine avenues and buildings, is surrounded by a belt of park-land, several suburbs, including Glenelg and Port Adelaide, and is within eleven miles of the summit of Mount Lofty, the ascent to which is easy. The other important towns are *Mount Gambier*, at the foot of the extinct volcano in the south-eastern district, centre of the "garden of the colony" ; north of the capital are *Gawler*, on a river of the same name, situated in an extensive wheat-growing district ; *Kapunda*, noted for its copper mines, worked from 1843 to 1879 ; *Kooringa*, containing the famous Burra mine. *Moonta* and *Wallaroo*, possessing rich copper mines and the largest smelting works in Australia, are on Yorke Peninsula ; and *Port Pirie* and *Port Augusta* on Spencer Gulf. All these towns are connected by rail with Adelaide. *Port Lincoln* has a commodious harbour, and is the chief town on Eyre Peninsula, which is occupied mostly by sheep farmers.

FIG. 310.—*Average population of a square mile of South Australia.*

Northern Territory.—Settlements were formed on Melville Island in 1824 and at Raffles Bay in 1827, but both were abandoned in 1829. Another settlement was formed at Port Essington on Coburg Peninsula in 1838, as a military post and harbour of refuge, but this also was abandoned in 1849. *Palmerston*, the capital (founded in 1869), occupies an elevated site overlooking Port Darwin, one of the finest harbours in Australia, and contains the offices of the government Resident, the officials of the territory, and of the telegraph departments. The transcontinental railway, which has its terminus here, now extends to Pine Creek, 146 miles inland. The country is well adapted for tropical and semi-tropical products, and is believed to be rich in minerals. A large extent of the territory is at present leased for pastoral pursuits. Pearl fishing is carried on chiefly at Melville Island. This island, about fourteen miles from the mainland, is 75 miles long by 37 broad, covered with mangrove swamps and dense forests, and inhabited by Australian animals and intractable aborigines.

STATISTICS.

	1886.	1896.	1901.
Area of South Australia Province (square miles)	380,070	380,070	380,070
,, Northern Territory (square miles)	523,620	523,620	523,620
Population of South Australia	304,336	355,286	362,604
,, Northern Territory (exclusive of aborigines)	—	4,934	4,096
Density of population, South Australia Province	1	1	1
Population of Adelaide and suburbs	128,377	140,406	163,430
,, Port Pirie	—	5,000	—
,, Kapunda	—	3,800	—
,, Mount Gambier	—	3,000	—

RESOURCES OF SOUTH AUSTRALIA AND NORTHERN TERRITORY, 1897.

No. of Sheep.	No. of Cattle.	No. of Horses.	Value of Wool.	Value of Copper.
5,092,000	540,000	180,000	£1,790,700	£238,000

ANNUAL PRODUCE OF WHEAT IN BUSHELS.

1883–84.	1891–92.	1893–94.	1896–97.[1]	1897–98.[1]
14,649,000.	6,436,000	13,618,000	2,804,000	4,014,800

ANNUAL TRADE (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	3,397,000	5,856,000	7,420,000
Exports	4,223,000	5,338,000	8,255,000

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II.—WESTERN AUSTRALIA

BY THE HON. DAVID W. CARNEGIE.

Position and Extent.—Western Australia includes all that portion of the Australian continent extending to the west of the meridian of 129° E., and is situated between the parallels of 13½° S. and 35° S. Its most westerly point, Dirk Hartog Island, is in longitude 112° 52′ E. The State includes all the islands adjacent to the coast of the mainland in the Indian and Southern Oceans. The greatest length is 1,480 miles, and the greatest breadth about 1,000 miles, with an area of 975,920 square miles, or nearly one-third of the whole continent of Australia, or equal in extent to one-fourth of Europe.

Surface and Agricultural Resources.—The coast-line is short compared with the large extent of the territory, being little broken by bays, gulfs, or river mouths. Consequently, natural harbours are wanting. The principal anchorages used are open roadsteads, only partially protected, the most noticeable exception being Princess Royal Harbour, the inner bay of King George Sound. At Fremantle, at the mouth of the Swan river on the west coast, harbour works of large extent are nearing completion. King Sound and Cambridge Gulf in the northern portion of the colony are inlets of considerable size, and would appear to be fine natural harbours; but their value must be discounted by the great tidal range.

[1] Droughty seasons.

The rise and fall of ordinary tides in Cambridge Gulf is 20 feet, in King Sound 46 feet. Further south the difference decreases, until on the south and south-west coasts there is no tidal rise worth mentioning. A striking feature on the south coast is the entire absence of rivers or even streams of any size until the extreme south-western corner of the territory is reached. High cliffs along the south coast form the abrupt termination of an elevated limestone tableland, which extends some 200 miles inland between the meridians of 121° and 129° E. This tableland in winter has the appearance of magnificent pasture land, there being probably a fair rainfall. No surface water occurs, with the exception of small rock-holes, and consequently the land has not been settled. In this district cylindrical cavities in the rock are frequently found, reaching to unknown depths, and known as "blow-holes" from the sound of rushing wind that they emit. Along the south coast, west of 121° E., eucalyptus forest land begins, and extends over the whole south-western corner of the colony, forming one of its richest resources. Here the immense Karri and Jarrah trees attain a height of between 200 and 300 feet. Jarrah timber is extraordinarily durable, resisting the white ant and the *Teredo navalis*, and consequently admirably adapted for railway sleepers, and piles for bridges or sea jetties. Karri timber is largely exported, being used chiefly for wood paving. The forest land when cleared is eminently suited for agriculture.

Along the west coast there are numerous rivers; of these the Swan river is the most important, those further to the north being for the most part mere storm channels filled only during the rainy season. The occupied portion of the colony extends along the west coast for about 1,200 miles, the most thickly peopled part being that lying roughly between Geraldton and Albany (King George Sound). Here farming and viticulture is carried on, the area for the cultivation of cereals lying south of 28° S. The total area under crop is about 202,000 acres, the principal crops being wheat, barley, oats, maize, potatoes, hay of all kinds, green forage, onions, and other root crops, and vines. As well as the grape a great variety of fruit is grown, particularly oranges, lemons, apples, and peaches; and these are capable of being produced in large quantities. Between 28° S. and 20° S. the occupied portion of the colony follows the western coast-line with a breadth of some 250 miles. In the valleys of the numerous rivers, cattle and sheep stations have been established. North of the De Grey river an unbroken stretch of coast-line known as Eighty-mile Beach, a flat sand plain, the western extension of the great inland desert, intervenes between the pasture lands of the north-west and the rich Kimberley country, where, in the valleys of the Ord, Margaret, Fitzroy, and Lennard rivers, cattle, sheep, and horses are reared with success. The total number of live stock at the end of 1900 included 68,000 horses, 340,000 cattle, over 2,400,000 sheep, and nearly 4,000 camels, imported from India and South Australia. The pearl fisheries on the

north-west coast are important. Coal is found in the south-west of the colony ; copper, lead, tin, iron, antimony, zinc, manganese, and asbestos form the chief mineral resources, other than gold, as yet undeveloped, but likely in the future to afford valuable returns.

Mountains and Deserts.—The mountains of the state are not of great height nor of frequent occurrence. The most important range is the Darling, which extents from the extreme south-western corner, running parallel to the coast-line at a distance of 20 miles, for 300 miles to the northward. Its highest point, however, is only 1,500 feet. The Stirling Range, 40 miles inland from Albany, attains a height of 3,500 feet, and from its isolated position on the low coastal plain is visible for an immense distance. Mountainous country follows the western coast-line at a distance of 200 or 300 miles inland, giving rise to the rivers of that coast. High country is found in the north, in Kimberley Division, where the Leopold and Müller Ranges attain a height of 2,300 feet. No mountainous country of any extent occurs in the far interior, though numerous isolated hills and ranges of sandstone are met with. South of 19° S. and east of 122½° E. an elevated sandy tableland, roughly estimated at 1,000 to 2,000 feet above sea-level, cuts off the settled portions of the colony from the populated districts of South Australia. Between 26° S. and 31° S. the Queen Victoria Desert lies, uninhabited except by a few scattered tribes of aborigines. Undulating sand-hills, or sandy plains covered with dense acacia scrub, almost devoid of surface water, met the eyes of the few that have penetrated far inland. Low ranges and cliffs occur at intervals along the parallel of 26° S. latitude. North of this lies Gibson Desert, a barren expanse of stones and gravel, reaching to the Tropic of Capricorn. Beyond this the great sandy desert rolls away to the northward, ridge succeeds ridge of drifted sand, parallel one to another, and stretching nearly due east and west. These sand ridges, doubtless formed by the winds, vary in height from a few feet to one hundred, the average distance between them being about 300 yards. It is an uninhabitable desert, waterless, and barren of all vegetation excepting that plant of spines and prickles commonly known as Spinifex (*Triodia*).

The so-called lakes of the interior are merely vast sheets of stiff mud, sparkling with salt in the dry seasons, and covered after the rain to a depth varying from a few inches to four or five feet with water which rapidly becomes salt. To the west of the Darling Range numerous salt and fresh-water lakes occur, but many of them also dry up in the summer months.

Geology and Mineral Resources.—Geologically, Western Australia is built up of crystalline and schistose rocks ; including a great development of granite with auriferous quartz, quartzite and ironstone, in the southern portion. On the west coast is a long strip of Tertiary formation, and older deposits extending from the Carboniferous to the close of the Cretaceous run in a comparatively narrow band along the north-west coast.

The strip of Tertiary strata is separated from the Secondary formations by a narrow transverse band of volcanic rocks.

Settlement has now penetrated over 500 miles inland, owing to the discoveries of rich gold deposits. The gold-fields may be said to form a belt, unbroken save by the Eighty-mile beach, running parallel with the coast-line from Kimberley in the north to Dundas in the south, including Pilbarra, Ashburton, Gascoyne, Murchison, East Murchison, Yilgarn, Mount Margaret and Coolgardie. The Kalgurli and Coolgardie gold-fields, extending to the 125th meridian, as well as other fields, are being rapidly developed. The export of gold was 1,880,000 ounces for the year 1901, and the total amount exported from the State from 1895 to 1901 inclusive was about 5,700,000 ounces. Gold, therefore, forms one of the State's richest sources of wealth, and the excitement caused by its discovery has attracted a great increase of population. The imports chiefly consist of provisions, machinery, ironware and clothing, while the exports are mainly wool, gold and timber, but also include some tin, copper, guano, sandal-wood, pearls, pearl-shells, and kangaroo hides.

Climate.—The climate generally is good and healthy, naturally varying considerably owing to the extent of the State. In the north it is tropical, with a wet season between December and March, that is during the hottest months. The heat is extreme, but away from the coast the air is dry. On the north-west the same conditions hold ; but during the rainy months tremendous cyclonic disturbances occur, causing great damage to live stock and property. In the south and south-west the climate is temperate for the greater part of the year, December, January, and February being the hottest months. In the interior the heat is extreme, but not enervating, on account of the dryness of the air. During the winter months, June and July, the weather is often cold, and slight frost is experienced at nights ; in the far interior the thermometer has recorded as low a temperature as 17° F. in the very early morning. The annual rainfall varies from 33 inches at Perth to 21 inches in Kimberley, 10 inches in the north-west, and 9 inches in the Coolgardie district, and from 37 inches at Augusta in the south-west, to practically nothing in parts of the far interior.

Aborigines.—The aborigines of Western Australia differ in no great degree from those of the other parts of Australia. Their origin is unknown, and since they possess few traditions and no written language, it is likely to remain so for all time. Their dialects, habits, weapons and characteristics vary considerably. Those of finest physique are found in the north, and it is thought by some that a strain of Malay blood may account for this. Wallace's description of the natives of Australia applies fully to those of the western state. In height they fall but little short of the European, though inferior in muscular development, the limbs often being little more than bone. The cranial formation is narrow and long, with high cheekbones, the lower portion of the forehead about the brows

projecting, the upper receding; the nose, narrow above, becomes broad and squat further down; the ears are inclined forward, the mouth is large and unshapely, with white, well-formed teeth; the jawbone is contracted, and the chin small. The complexion is dark brown, almost black, while the hair is pitch black, and sometimes inclined to curliness. Their intelligence is not of a high order, though they show a certain quickness of apprehension, and great imitative powers. The tribes are nomadic though confined to certain bounds. In no part are villages or kraals built, and amongst the inland tribes even houses or huts of grass or branches are unknown. They are seen now in greatest numbers in the Kimberley district, and in the ranges from which the rivers of the west coast take their rise. In the south and south-west they are rapidly decreasing in number, and will soon be extinct. Small tribes are found in the interior, living from hand to mouth on lizards, iguanas, and other reptiles, depending for their water supply on wretchedly supplied rock-holes and native wells, naked and houseless, always forced by the stern nature of the country to be moving on. Kangaroo, emu, pelicans, ducks, fish, and edible plants form the food of the coastal tribes; their weapons, well suited to their purposes, include the boomerang, spear, throwing stick, club or waddy, and the wommera, mero, or wanner, the flat board with which their spears are thrown. The spears vary in size and manufacture. In the north they are formed of cane and bamboo, and tipped with delicately-chipped heads of quartz, opaline, or since the advent of the white man, of glass, or the material of telegraph insulators. Spears with sharp and cunningly devised wooden and bone barbs are used further to the south, whilst in the interior spears with sharpened wooden points are found. Though to all appearances little above the beasts of the field in their mode of life, they have laws and ceremonies of great mystery and import. Several missions have been established amongst them, and in some cases with good results. A good many aborigines are employed on cattle and sheep stations, where they soon learn to become useful and clever servants. Habitual cannibalism does not seem to be practised, though some authenticated cases have been reported in the north-west and in the north.

FIG. 311.—*The Badge of Western Australia.*

Colonial History.—With the landing of the emigrants from the *Parmelia*, the history of Western Australia as a British colony begins, on the 2nd of June, 1829. The first camp of settlers was known as the Swan River Settlement. Closely following the *Parmelia* and *Sulphur* a number of vessels arrived, rapidly adding to the band of pioneers, and bringing the necessary live stock for colonisation. Since the time of its foundation the authorities and people of the colony have never given up the work of exploration, and from 1829 to 1899 no year has passed in which new districts have not been opened up, new pastures or minerals found,

whether by government or private enterprise. From the seventy passengers of the *Parmelia* the population had grown in 1901 to the number of 184,000, exclusive of coloured people. At first a Crown Colony, under a Lieutenant-Governor, Western Australia received Responsible Government in 1890, and became an Original State of the Commonwealth. The railway system of Western Australia has made great strides. There were more than 2,000 miles of railway open in 1902. The Great Southern line connects the capital, Perth, with Albany, on King George Sound, and the Eastern connects the capital with Fremantle, and Kalgurli, Coolgardie, and other mining towns in the interior. The Midland and Northern lines join Perth to Cue. There is direct telegraphic communication with the outer world through Java by a cable from Roebuck Bay in the north-west, and also by a land line in the south, through Eucla to Adelaide.

The Chief Towns.—*Perth*, the capital, is prettily situated on the Swan river, some ten miles from its mouth. It is the seat of Government, the residence of the Governor, and contains the Houses of Parliament, a museum, mint, botanical gardens, observatory, cathedral, and public parks. A causeway bridge, connecting it with *South Perth*, crosses the Swan river, at the mouth of which *Fremantle*, the chief port of the colony, is situated. It has railway, road, and river communication with the capital. Extensive harbour works are being carried out, which will enable the mail steamers to make this their port of call, and so shorten the time of transit for mails from England. While of advantage to the general community, the completion of this harbour will deal a blow to *Albany*, on Princess Royal Harbour, in King George Sound, the present port for mail steamers, the terminus of the Great Southern Railway, and a coaling station for the British navy. The entrance to the harbour is defended by forts in which a permanent force of artillery is kept, under the command of an imperial officer. The junction of the railway systems at Perth makes possible a through journey of over 500 miles from Albany to *Geraldton*, on Champion Bay on the west coast (Fig. 293). This is the port for the Murchison district, which is rich in minerals, and for agricultural and pastoral purposes. Seven thousand bales of wool are annually exported. A railway connects Geraldton with *Cue*, the chief town of the Murchison gold-fields, nearly 300 miles inland, and in the not distant future it will be possible to travel by rail from Geraldton, through Cue, to *Menzies* and *Coolgardie*, the capital of the gold-fields of that name. In 1892 a mere camp of tents, in 1891 a part of the silent bush, by 1898 Coolgardie could boast its stone and brick buildings, hotels, stock exchange, churches, and electric light, railway and telegraph. It is surrounded by gold mines in

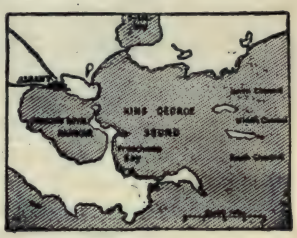

FIG. 312.—*King George Sound and Albany.*

active operation, saw-mills, brick and tile works, and other progressive industries. The water supply is brought in pipes from the Coast mountains, not far from Perth, a distance of more than 300 miles. The railway from Perth passes through *Southern Cross*, for long the last outpost of civilisation, and *Kalgurli*, some twenty miles beyond Coolgardie and nearly 400 miles east of Perth, as far as *Menzies*. Kalgurli has eclipsed Coolgardie, and has become the scene of the most active gold-mining operations in the colony. The most important centre for pearl fisheries is at *Broome*, on Roebuck Bay, on the north-west coast; the landing-place of the submarine cable from Java. The centres of farming and agriculture are *York* and *Northam*, about forty miles east of Perth. Coal is obtained at *Collie* in the south-west.

STATISTICS.

	1881.	1891.	1901.
Area of Western Australia in square miles	975,920	975,920	957,920
Population (excluding Aborigines)	29,708	49,782	184,124
„ Perth	5,044	9,617	36,274
„ Fremantle	3,641	7,077	20,444
„ Coolgardie	—	—	—
„ Kalgurli	—	—	—

ANNUAL TRADE OF WESTERN AUSTRALIA (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.	1901.
Imports	288,000	520,000	2,011,000	6,454,000
Exports	353,000	469,000	1,036,000	8,515,000

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CHAPTER XXXIV.—NEW ZEALAND

By the Hon. W. P. Reeves,
High Commissioner for New Zealand.

Position and Extent.—The Colony of New Zealand is an archipelago, with a total land area of 104,471 square miles, lying in the South Pacific, about 1,200 miles east-south-east of Australia, and almost entirely between the parallels of 34° and 47° S. Its two main islands, called North and South respectively, and a third and much smaller island, named Stewart, lie close to each other. Of the other and smaller groups the Kermadecs, about 500 miles to the north of the main islands, the Chathams about the same distance to the east, and the Aucklands about 200 miles to the south are the chief. Others are the Campbell, Antipodes, and Bounty groups, all of which are uninhabited, and, from their isolated position and cold, bleak climate, likely to remain so. The long, narrow, irregular chain formed by the main islands is distinguished by height and variety, by an extensive coast-line—4,330 miles—and a climate passing by degrees from subtropical to the cooler temperate. The extreme length of North Island is 515 miles, and its breadth varies from 6 to 300; of South Island the length is 525 miles, the greatest breadth 180.

Coasts.—On the whole the coasts are high, sometimes grandly precipitous. Deep water is nearly always found close to the shore. The inlets are numerous, but the harbour accommodation not very conveniently distributed. In the south-west of South Island many sounds or fjords penetrate, and are overhung by the towering ranges of the Southern Alps. Their combination of mountainous grandeur and lavish vegetation makes them at least rivals of Norway or Alaska, and as anchorages they are not easy to surpass. But they give access to nothing better than storm-beaten and well-nigh uninhabitable mountains. When, north of these fjords, a more practicable country is reached there are no harbours but the mouths of bar-bound rivers. This is true also of the whole western coast of North Island, though some of its bar-harbours are very commodious when once they are entered. The eastern side is, on the contrary, well provided with harbours in its more northern portion. Among them Waitemata, the port of Auckland city, is one of the best in the southern hemisphere. South of the Bay of Plenty, however, there is no such thing as a good natural harbour found right down to Cook Strait. Fortunately this channel, which divides North and South Islands, and is but sixteen miles across in its narrowest part, is well furnished with havens, on one of which, Port Nicholson, Wellington (the political capital of the colony) holds

an unrivalled commercial position with easy access by steam to both coasts of both islands. On the southern side of the strait is another series of sounds, beautiful, though not equal in magnificence to the fjords of the south-west.

Little natural shelter is afforded by the eastern coast-line of South Island. But about half-way along the coast a large volcanic peninsula, named by Captain Cook after his friend, the distinguished naturalist, Sir Joseph Banks, juts out in picturesque hills, the highest of which is slightly over 3,000 feet in height. Several of its inlets provide excellent refuge for shipping ; one of them, Akaroa, is an admirable natural harbour, and another, Lyttelton, has been artificially made one of the most commodious in New Zealand. Further south Port Chalmers, a large bar-harbour of the less impracticable class, has also been greatly improved by dredging and other works. On Foveaux Strait, by which Stewart Island is separated from South Island, The Bluff is the port of the large district of Southland. Twenty-nine coastal lights have been erected by the colonial government, eight of the first class, fifteen of the second, three of the third, and three yet smaller. This is exclusive of harbour lights. The coast is stormy, but fogs are rare.

Mountains.—The most striking physical characteristic of New Zealand is the parallel system of mountain ranges which form its back-bone. Starting in the extreme south-west, they run north-eastward, are interrupted by Cook's Strait, but end only near East Cape, at the point of the shoulder which forms the south-eastern corner of the Bay of Plenty. They reach their greatest height near 40° S., where they are known as the Southern Alps, and there Mount Cook or Aorangi attains to 12,349 feet, the noblest of many fine peaks. In this part of the Alps there are glaciers exceeding those of Switzerland in size. On the west side some of them descend to within a thousand feet of sea-level, and penetrate the forest zone. Further north the Alps fork, so as to reach and overlook both the east and west shores of South Island under the names of the Kaikoura and Tasman Ranges. In the former Tapuae-nuku is 9,462 feet high.

The continuation of the chain in North Island is at a lower elevation. Near its north-eastern end Hikurangi, 5,606 feet, is at once its highest and most picturesque summit. Westward of and quite apart from the main range three remarkable volcanoes present a striking appearance. Two of them, Ruapehu, 9,008 feet, and Tongariro are still active, and from the three craters of the latter, of which the highest is Ngauruhoe, 7,515 feet, steam and noxious vapours constantly issue. The fine cone of the third, Egmont, 8,260 feet, slopes in solitary beauty to the western sea-shore, and in the symmetry of its form is considered to equal its famous Japanese congener, Fujiyama. Ruapehu and Tongariro are at the south-eastern end of an interesting volcanic line which is prolonged to White Island, an insular cone in the Bay of Plenty, incessantly active and noted for its sulphur deposits. On either side of the line lies the Hot Lakes District, abounding in hot and warm springs and pools, geysers, solfataras, and

fumaroles. The chemical properties of many of the thermal waters, some sulphur-acid, some sulphur-alkaline, are potent for the cure of illness, especially gout, rheumatism, skin-diseases, and disorders of the throat, liver, digestion and nerves. A number of bathing establishments and a government sanatorium are already the resort of invalids and tourists.

The lakes of the islands are many: the largest, Taupo, about twenty miles long, and as many broad, lies in the very centre of North Island, but on the whole the most picturesque sheets of water are the deep, ribbon-like Wakatipu (54 miles long), Te Anau (132 square miles), and the strangely irregular Manapouri, all found amongst the Southern Alps.

Surface of South Island.—The western half of South Island may be summed up as a mountainous country, fit chiefly for miners, shepherds, and timber cutters, and in places not even for these. West of the watershed the mountains are, as a rule, clothed with forest and drenched with a copious rainfall, which in the fjord region is as heavy as 170 inches per annum. Here and there in river valleys or coastal strips are patches of arable land, fertile, but usually troublesome to drain and clear. East of the watershed the ranges are for the most part bare of timber, and below the snow line carry sparse but nourishing native grasses. Here and there an elevated plain is found, such as the Mackenzie or Maniototo, useful, but bleak in winter. Towards the east coast, however, there are considerable tracts of level or undulating country. The largest of these, the Canterbury plains, which is about 160 miles long and 30 miles broad in its widest part, is almost a dead level. At the south end of the island wide expanses of arable land occur in the district of Southland.

Stewart Island, on the other hand, is broken and forest-clad throughout, has beautiful inlets on its eastern side, and presents a bleak, bold western coast to the fierce south-westerly gales from the Antarctic. From the Kaikouras to Foveaux Strait the treeless and, on the whole, fertile character of the country rendered it easy of occupation by graziers and farmers, and a belt of almost unbroken settlement of an average breadth of 25 miles from the coast may now be found there. In certain localities agriculture has ceased to be rough and primitive, and is now carried on with no small outlay of skill and capital.

Surface of North Island.—In North Island the two most valuable tracts of country are those on the middle parts of the east and west coasts. On the east coast the district round Hawke Bay is rolling and in part a dead level of great fertility, though rather exposed to floods. On the west coast the country is more undulating, swelling in places, and in others made up of low, steep hills of a blue calcareous clay called "Papa," the soil of which is exceedingly well fitted for pasture. From about thirty miles to the north of the city of Wellington as far as the harbour of Kawhia, a fertile territory extends which was formerly covered with forest, now to a large extent cleared away, and is without a superior in the

colony for dairy farming and for some kinds of sheep. Another useful piece of country is the central plain of the Wairarapa lying between mountains in the southern part of the island. The Hot Lakes District is, however, for the most part covered with pumice-sand too porous to carry grass well. The Onetapu and Waingaroa Plains there, at a mean elevation of about 2,000 feet above sea-level, seem empty and desolate. Further north the soil of a large portion of the province of Auckland is made up of stiff white or yellow clay, fertile only after assiduous tilling. Here and there, however, this is relieved by strips and patches of alluvium of great fertility, and some of considerable extent.

Rivers.—Throughout the islands it is scarcely possible to travel more than two or three miles anywhere without encountering a river or stream of greater or less size. Nearly all are perennial, and the volume of water discharged into the sea by some of them is surprisingly great in proportion to their length. But the narrow, elevated nature of the country gives most of the rivers the character of mountain torrents—swift, cold, liable to sudden floods, and of but little use for navigation. Among the exceptions to this, however, is the longest river in the colony, the Waikato, which flows northward from Lake Taupo. It is traversed by river steamers for a great part of its course. Several of the western rivers of North Island, notably the Wanganui, flow between high cliffs thickly clothed with vegetation of remarkable richness and beauty. Many of the rivers of South Island wander about beds of shingle, sometimes miles in breadth, and constantly change their swift and shallow courses in a fashion costly and puzzling to road-makers and bridge-builders.

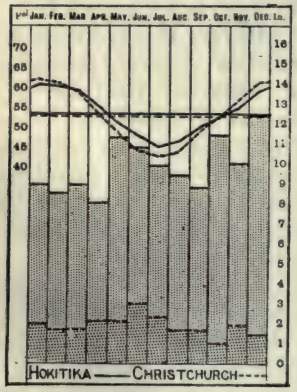

FIG 313.—*Temperature and Rainfall of Hokitika and Christchurch.*

Climate.—Though singularly healthy and on the whole agreeable, the climate of New Zealand is distinctly warmer than even the southern part of Great Britain. The average temperature of the air in South Island is 4° and in North Island 7° higher than that of London. It is, however, more equable. The variation between the extremes of daily temperature is 20° only, and the average difference between the mean of the warmest and the coldest month is 5° less than in Jersey. Except on the saturated and almost uninhabited south-west coast, almost the only serious climatic drawback is wind. The narrow mountainous islands lie in the "roaring forties," and the gales in Cook and Foveaux Straits, and in the neighbourhood of some of the alpine gorges are frequent and severe. The average annual rainfall in the more important centres of settlement is, at Auckland 42 inches, at

Wellington 50, at Christchurch 26, at Dunedin 36. At Hokitika on the west coast of South Island it is 120 (Fig. 313).

Flora.—The flora of New Zealand is striking, varied and beautiful. Nearly half the colony, including almost the whole west coast, was until recently clothed with dense forest. The eastern half of the islands except in the far north and the extreme south-east corner, is usually open and covered with wiry indigenous grasses, or in the swamps with the tall *Phormium tenax*, or native flax. The forest trees are evergreens, and the larger, mostly pines (which, however, bear little resemblance to the pines of Europe) or small-leaved beeches. In the northern half of North Island, the huge kauri pine, often from eight to twelve feet in diameter, yields a fine timber, as well as the resin or kauri gum of commerce. Lianas, flowering creepers, one palm (the *nikau*), and a palm-like lily, add to the beauty of the forest, but to botanists the most engrossing division of the New Zealand flora is the ferns of which there are scores of species, mostly peculiar to the islands. Tree ferns as high as sixty feet are met with. In the more closely settled districts, imported willows, poplars, Australian eucalpytus, and Californian pines make up the plantations. All English flowers and fruits, and, in North Island, oranges and lemons, are cultivated. Some ten million acres are sown with English grasses.

Fauna.—Animal life in New Zealand, before colonisation, was remarkable for the paucity of land mammals and reptiles. A rat with round ears like a mouse, a smallish dog, and two kinds of bats alone represented the mammals, and of these the dog is now extinct, and the rat rarely seen. Lizards were the only reptiles, and a small and not widely distributed frog the sole amphibian. The native birds are numerous and interesting, especially in the forests. Several, notably the *tui* and the *mako mako*, sing very sweetly. The islands were formerly the home of the gigantic wingless *moa*, whose skeletons are now prominent in museums. Wingless birds still live in the shape of the *kiwi* and *takehé*, the latter extremely rare. The *weka*, called wood-hen from its likeness to the domestic fowl, has rudimentary tufts of feathers in place of wings, and the *kakapo*, or ground-parrot, has wings but cannot fly. No large fresh-water fish are indigenous though eels were common and sometimes grew to a great size.

All English domestic animals have been introduced by the colonists, and have thriven; this is true also of such English birds as the skylark, blackbird, starling, house-sparrow, and goldfinch, and certain game-birds, notably the pheasant. Pigs introduced by Captain Cook have run wild, and afford sport, as do red and fallow deer, hares and rabbits. Rabbits are now a serious plague, though stoats, weasels and ferrets have been imported to prey upon them. Trout have been acclimatised, but not salmon, despite many attempts. Sea fish are fairly plentiful; the schnapper, flounders, and a kind of whitebait are especially good eating.

People and History.—When discovered by Europeans the islands were sparsely peopled by the Maori, a brown Polynesian race which had

colonised them some five or six hundred years before. They were intelligent and physically active, tall, and well-built, good canoemen, fishermen, and tillers of the soil. They showed considerable skill in wood-carving, but had no knowledge of writing, metals, or pottery. They were ferocious cannibals, constantly engaged in tribal wars. Their religion was a vague polytheism, and their government a rule of priests and chiefs enforced largely by the famous *tapu* (taboo). The first European to encounter them was the Dutch sea-captain, Tasman, who lighted upon the islands in December, 1642, but did not land. Not recognising their insular character, he gave them the name of Staaten Land, which was afterwards changed to New Zealand. Not until 1769 were they again visited, but then Captain Cook circumnavigated them in successive voyages, and mapped out their coasts with great care and accuracy. He took possession of them, but the British government repudiated his action, and for seventy years the country remained a No Man's Land. Early in the nineteenth century it became the haunt of whalers, sealers, and traders in timber, flax, native weapons and mantles, and tattooed heads. Samuel Marsden, Anglican chaplain in New South Wales, established a mission there in 1814. Some years later the Maori began to obtain muskets and powder, and in twenty years a fourth of their race perished in war. After about 1825 the missionaries began to make numerous converts, and by 1838 the wars died away. The growing number of white adventurers, however, domiciled in the country, and their enormous land claims made some sort of settled government necessary. The French decided to annex the islands, but they were anticipated by the New Zealand Company, an English colonising association, founded by Edward Gibbon Wakefield. This Company forced the Colonial Office to take possession of New Zealand by despatching emigrants thither, who reached Wellington on January 29, 1840. A week earlier, however, Captain Hobson had landed in the Bay of Islands, with a dormant commission in his pocket authorising him to annex the country. This he did after entering into a treaty with the principal native chiefs, 512 of whom signed it. The British flag was hoisted in South Island in July of the same year, only a few days before the arrival there of a French frigate sent to take it. Until 1853 the colony was personally ruled by Governors. Parliamentary government was not fully established until 1856. After various modifications it has taken the form of a bicameral system, under which members of the Upper House are nominated for seven years, and those of the Lower elected for three under a universal franchise possessed and freely used by women as well as men. The British Viceroy has the right of dissolution, and may—and occasionally does—reserve laws for the consideration of the Imperial government. Foreign affairs are expressly and currency law virtually excluded from the purview of the parliament.

FIG. 314.—*Badge of New Zealand.*

The settlement of the colony was pushed not from one centre but from nine or ten different points on the coasts. Hence arose a strong local feeling which still exists. The colonists are almost entirely British—English, Scots and Irish in order of strength. A small German and Scandinavian element is now almost absorbed. Chinese immigration is checked by a £50 landing-tax, and the Chinese have diminished from eight thousand to three thousand. The Maoris, who, after more than one obstinate war with the settlers have been at peace for nearly a generation, are still slowly declining, though half-castes increase. The birth-rate amongst the whites falls steadily but the death-rate is the lowest in the world. As to numerical strength the religious bodies rank thus: the Church of England, Presbyterian, Wesleyan and Methodist, Roman Catholic. Education is free, secular and compulsory. There are good secondary schools, and a university with five colleges.

FIG. 315.—*Average population of a square mile of New Zealand.*

Industry and Trade.—The chief occupation of the people is the grazing of sheep and cattle, and certain industries cognate thereto, such as cheese and butter making, the freezing of mutton and beef for export, wool-scouring, bone-crushing, tanning, and the manufacture of boots and shoes, and woollen stuffs. The best frozen mutton imported into Great Britain comes from New Zealand. Agriculture comes next to grazing, and gold and coal mining follow agriculture. Timber-cutting and kauri gum digging are of importance. Brick and tile making, furniture making, iron founding and machine making, flax-dressing, printing, jam making and brewing are other industries. Distilling is prohibited by law. Most manufactures are more or less protected by customs duties, often as high as 20 and 25 per cent. *ad valorem*. Butter and cheese are of excellent quality, and are made in factories on the Danish system for export to Great Britain. Three-fourths of the trade of the colony is with the mother country, and nearly all the rest within the British Empire—with Australia, India and Fiji. The colony is well provided with State-owned railways, telegraphs and telephones.

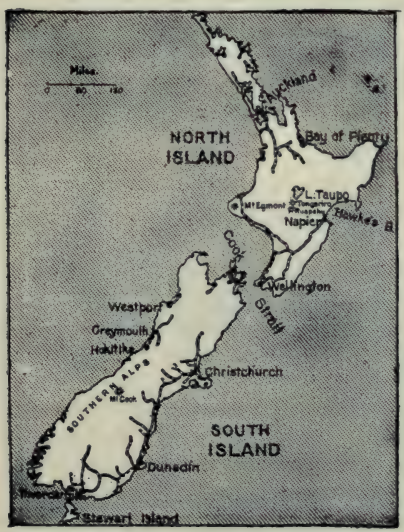

FIG 316.—*The Railways of New Zealand*, 1899.

The four chief ports are fortified with batteries and torpedoes. In case of war about eight thousand fairly efficient volunteers could be immediately mustered. A British warship, towards the cost of which the colony contributes, is stationed in New Zealand waters.

Towns.—For many years New Zealand was divided into provinces. Though these were legally abolished in 1876, the names of the Provincial Districts are still used for the sake of convenience, and the colonists commonly speak of them. They are Auckland, Taranaki, Hawkes Bay, Wellington, Nelson, Marlborough, Canterbury, Westland, Otago, Southland. The four principal towns are Auckland, Christchurch, Dunedin and Wellington. *Auckland* is the most attractive to the eye, and its fine harbour is important for trade. *Wellington*, though still the smallest, is the capital, and is overtaking the others in population. Unlike the others, which are by the sea, *Christchurch* stands inland on the Canterbury Plain. All the towns are railway termini. *Dunedin* is the centre of the Presbyterian Church, Christchurch of the Anglican. All are fairly well paved, and lighted with gas or by electricity, and are provided with churches, theatres, halls, and recreation grounds. Most of the buildings are of wood. The rather mean architecture is pleasantly redeemed by the trees and gardens in which most of the residences stand. The towns are well drained and healthy. The hours of labour seldom exceed eight and a half a day, with a weekly half-holiday. Football is the favourite athletic sport, and horse-racing very popular.

FIG. 317.—*Auckland Harbour.*

STATISTICS.

Area of New Zealand (square miles)	104,471
North Island	44,468
South Island	58,525
Stewart Island	665
Chatham Islands	375
Other Islands	438
Number of acres under cultivation (1898)	11,483,127

	1881.	1891.	1901.
Population	530,000	688,651	815,862
Density of population per square mile	5	6	8

POPULATION OF TOWNS.

	1891.	1901.		1891.	1901.
Auckland (with suburbs)	51,297	67,226	Christchurch (with suburbs)	47,846	57,041
Wellington „ „	34,190	49,344	Dunedin „ „	45,869	52,390

ANNUAL TRADE OF NEW ZEALAND (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	6,323,000	7,837,000	6,579,000
Exports	5,324,000	6,745,000	9,229,000

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CHAPTER XXXV.—MELANESIA

Position.—The great island of New Guinea, or Papua, occupies an intermediate position between the continent of Australia and the Malay Archipelago ; but the character of its fauna and flora shows clearly that it belongs to Australasia. The aboriginal people, on the other hand, are distinct from those of both the great regions to north and south, but show affinities with the Melanesians who inhabit the chain of oceanic islands immediately to the east. New Caledonia, coming half-way between New Guinea and New Zealand, may also be considered as a Melanesian island.

I.—BRITISH NEW GUINEA

By Sir William Macgregor, G.C.M.G., C.B., M.D.,
Formerly Lieutenant-Governor of British New Guinea.

Position and Surface.—The colony of British New Guinea, formally annexed in 1888, occupies the south-east of New Guinea and a number of small islands. The total area of the colony is about 90,500 square miles, of which 2,700 square miles represent the small islands. With the exception of the low coral islands of Kiriwina, Nada, part of Murua, and a few others of small dimensions, the islands are mountainous and principally of schistose formation ; the highest, Goodenough, rises to 8,000 feet. The eastern end of the mainland part of the colony is also mountainous, and as the mountains extend westward they rise and coalesce to form a massive central chain, which attains its greatest altitudes in the Owen Stanley Range, the highest point of which is Mount Victoria, 13,200 feet, and in Mount Scratchley, the Wharton Range, and Mount Albert Edward (about 13,000 feet). Further west the range becomes more broken and lower, while pursuing nearly the same general trend towards the north-west. The western end of the colony is for nearly 300 miles generally low and swampy for a long distance inland. The mountains near the east end, on the mainland, are of igneous origin ; the great masses of the central part of the main range are all schistose, while in the west sandstone predominates, but there are outcrops of igneous rocks such as Mount Yule (about 10,000 feet). On the Fly river near the point of junction of British, Dutch, and

Fig. 318.—*New Guinea.*

German territory, and in other low grounds in the west, there are limestones with fossil corals. The whole possession is remarkably well watered; the mountains and most of the lower country are covered by forest.

Rivers.—Most of the principal rivers converge upon and enter the Gulf of Papua. The head streams of the Fly, the largest river in the island, spread over a large area in the centre of the island, its basin being shared by the three different territories. Its course is about 620 miles from the sea to the British-German boundary. The influence of the tide is felt over a hundred miles up the Fly; and it is navigable by a steam launch for over 500 miles. The Purari river is navigable by steamer for 120 miles. The Mambare, the chief river of the north-east coast, is navigable for about fifty miles.

Climate and Natural Resources.—As the colony lies between 5° S. and 11½° S. lat., the climate of the lower part of the country is warm. It is outside the range of the hurricanes that pervade the southern part of the western Pacific. At Port Moresby, near the middle of the colony, the average temperature at 9 a.m. for three years ending 1897 was 81° F. The extreme range of temperature was from 94° to 74° F. at 9 a.m. The hot season is from November to May, hottest in January and February; the cold season is from June to October, coolest in August. During the hot season unsteady north and north-west winds blow on the south coast; during the cold season they are from the south-east and are much more regular. At Port Moresby the rainfall of three years averaged 37 inches, at Daru in the western division 82·5 inches, while at Samarai near the south-east end of the mainland it was 126·5 inches in one year. It is much greater, but undetermined, on the central mountain ranges. The climate is generally agreeable at an altitude of 3,000 feet, a height that can be reached in one day from Port Moresby. At 5,000 to 6,000 feet it becomes distinctly cold at night, the thermometer sometimes reading 55° F., and at 10,000 feet ice is met with in the early morning. Malarial fever, of a type that is as a rule comparatively mild, is not rare on the low grounds. The obstinate scaly ring-worm common in many parts of the Pacific exists, and rheumatism is not unknown; but many of the infectious diseases of Europe have never been introduced. The climate is favourable to the cultivation of all tropical products, including rice and maize.

Flora and Fauna.—The flora is as varied as the climate. On the tops of the highest mountain chains there are many species of grasses, buttercups, forget-me-nots, daisies, rhododendrons and heaths. The forest there is principally cypress; from 7,000 to 10,000 feet it is chiefly myrtaceous, often covered by trailing bamboo or mixed with pandanus; and from 2,000 to 5,000 feet evergreen oaks are common. Native cloth is made by beating out the bark of the paper mulberry and other trees. Fibre is obtained from the banana, the coco-nut and the aerial roots of certain species of pandanus. There are no dangerous carnivora in the colony, although wild swine are common. There are several varieties of

wallaby, phalanger and echidna; and no deer, hares or rabbits. The most dangerous creature is the crocodile, which causes considerable loss of life, and there are poisonous snakes nearly related to those of Australia. The birds include the cassowary, many Birds of Paradise, pigeons, the hornbill, cockatoos, geese, ducks, quail, and on the mountain tops, snipe and woodcock.

People.—All the native tribes of the colony that have up to now been met with seem to belong to the same race; they present, however, well marked differences in physical appearance, disposition, language and customs. No clear trace of an old or earlier race than the existing one has been discovered. The present inhabitants doubtless arrived in the country when it was already covered by dense forest, which had its effect in separating them into secluded, shy and suspicious communities. Differences in the nature of the food and of the water also help to differentiate the people. Some live almost exclusively on sago, others on yams and taro, some on bananas, others principally on sweet potatoes. Many tribes live continuously in a heavy, moist, warm atmosphere near the coast line; others in the light and bracing climate of the mountains. The average size of a Papuan is less than that of an average European. The race affinities with the Pacific are strong; and on the coast line there is a smooth-haired Malay-like element that is absent in the interior. There is a well marked relationship to the languages of Polynesia, but the isolation of the different communities has led to such diversities of dialect that people living only a few miles apart cannot understand each other. The dialects are easy to acquire, containing few or no sounds that cannot be represented by the English alphabet, or be easily pronounced by an English-speaking person. English is now making considerable progress. The European population is about 500; the native population is estimated at about 350,000. There has been, however, no native census.

Government.—The possession has the constitution of a Crown Colony, but the cost of administration is chiefly defrayed by the Commonwealth of Australia, the exact relation of which to the Government of New Guinea was not defined up to 1903. There was no form of government among the native population. A certain measure of chiefly influence is being created now by a few men under government authority, but control over the natives is best acquired by the gradual creation of a force of village policemen. The administration has at its disposal an armed constabulary consisting of over a hundred natives enrolled from many different districts. There is a local Legislature nominated by the Crown, and consisting, with one exception, of officers of the government.

FIG. 319.—*The Badge of British New Guinea.*

Trade.—The chief industry worked by Europeans is alluvial gold mining; the number of miners has varied at different times from 100 to

800 men. The gold-bearing country is extensive, but very difficult to prospect. There are indications of auriferous reefs. The valuable mineral osmiridium has been found from the Gira river to the Owen Stanley Range, and coal exists in the Purari sandstone district. The pearl and pearl-shell fishery is of considerable importance, the shell being widely distributed over the eastern seas of the colony. Bêche-de-mer is found on most of the reefs, and turtle shell is common. Sandal-wood is sometimes found in the form of large trees, so far only in the central district on the mainland, and is exported. The rubber industry is important and promising; the indigenous trees alone yield this article at present, but both soil and climate should be favourable to the better sorts of foreign rubber trees. There are some good varieties of timber, including cedar and ebony. There can be no reasonable doubt that the sugar-cane, which is native and present in a great many varieties, sago, cotton probably also indigenous, coffee, tea, vanilla and tobacco, which is domesticated if not actually indigenous and of exceptionally fine quality, will eventually be very valuable. The external trade of the colony is chiefly with Queensland and New South Wales; it amounts to about £130,000 annually. The tariff is comparatively light.

A steamer runs regularly to the possession, starting from Sydney and calling at Port Moresby and Samarai, and proceeding to the Solomon Islands and thence back to Sydney. Much of the internal communication will be carried on by the rivers. Tracks have been cut right across the colony from north to south and in many other directions, and the natives are becoming accustomed to travel alone or with Europeans for great distances; but there are few roads.

Political Divisions and Towns.—The colony is divided into four magisterial divisions, in each of which there is a Resident Magistrate. The Central Court, which possesses the jurisdiction of an ordinary Supreme Court, sits wherever there is occasion. The principal seat of Government is at *Port Moresby*, which is centrally and picturesquely situated on a large and sheltered harbour, easy of approach and provided with substantial wharves. The population consists of about 1,000 natives and some 40 Europeans. The immediate neighbourhood is not suited for ordinary cultivation on account of the rather scanty rainfall. *Samarai*, the most important place, is situated on an islet lying about a mile from the mainland in the east. It is the headquarters of the Resident Magistrate of the district, and the European population is generally greater than at Port Moresby; there is no native village. The third port of entry for the colony is the island of *Daru*, the headquarters of the Resident Magistrate for the western division. It has a good and safe harbour, the only one the colony possesses in the west, and is visited by many boats engaged in the pearl-shell fishery of Torres Straits.

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II.—GERMAN NEW GUINEA

By Graf von Pfeil.

Position and Surface.—The coast of Kaiser Wilhelmsland, or German New Guinea, on the north-east of the island, runs nearly in a straight line from north-west to south-east for 600 miles. Two indentations, Astrolabe Bay and Huon Gulf, flank a peninsula on which rise the Finisterre and Rawlinson mountain ranges. Beyond this promontory no morphological development is noticeable along the coast, which yet has a number of good harbours formed by coral reefs bordering it. There are besides some good roadsteads sheltered by small coral islands and a few bays cut into marshy lowlands. So far no mouth of the numerous rivers of New Guinea has been found available as a harbour. The navigable rivers offer no building sites near their outlets, the banks of their lower course being mostly marshy plains suitable for rice-growing; those rivers which are not navigable have mostly too small an entrance from the sea to render them suitable. The Ramu has been found to be navigable, and when the Margaret river is explored, it is justly surmised that it also will prove navigable. The Kaiserin Augusta river has been ascended with a sea-going steamer for 180 miles. All the rivers carry a surprisingly large quantity of water, a circumstance no doubt due to the great elevation of the mountains which crowd this huge island, the interior of which is as yet almost unknown. The few expeditions that have ventured to open up the country found progress exceedingly difficult. There are no paths, the territory is terribly rugged, and covered with so dense an undergrowth of shrub that a road must be cleared with hatchets; a day's toilsome march may result in the advance of one mile. On the steep hillsides water is not always met with, so that expeditions suffer from thirst. From the sea, chains of tall mountains may be discerned far inland. Above all tower the two loftiest peaks of the Bismarck Range, Mounts Wilhelm and Herbert, exceeding 13,000 feet. It seems probable that these mountains form a continuation of those in Dutch New Guinea, on which, it is reported, snow has been observed, and that they lead on to the Owen Stanley Range, thus forming a central backbone. Of the geological character of these mountains absolutely nothing is known. In Huon Gulf the rivers bring down pebbles derived from ancient volcanic rocks, while north-west of the peninsula mentioned above more recent formations seems to prevail. A zone of coral rock forms the coast for some distance north-west of the peninsula and rises in a number of peculiar and very striking terraces to a great height. As far as can be ascertained this coral zone does not extend more than a few miles inland.

Climate, Flora and Fauna.—The climate is hot and moist, the yearly rainfall being very considerable, though subject to great variations; a difference of 79 inches has been observed. The seasons are not clearly

defined and there is no strictly rainy or dry season, but rain falls in nearly every month of the year. A very remarkable local influence on the distribution of the seasons seems to be exercised by the Finisterre Mountains; when the greater rainfall takes place east of them, their western part enjoys a dry season, and *vice versâ*. Heat, moisture and a rich soil combine to produce a most luxuriant vegetation. The whole country is covered with dense dank forest, the upper boundary of which has not yet been ascertained. Timber and a great variety of wood, valuable for cabinet makers' purposes, is plentiful, but difficult to obtain on account of the rugged character of the country. Banyan trees of gigantic size, with labyrinths of aerial roots, are frequently met with, the mango is found wild, huge tree-ferns delight the eye, and tangled lianas render progress next to impossible. Orchids of rare colour and shape are often found, and there is no doubt that the nutmeg also exists. The few plains known in New Guinea near Hatzfeldhafen and on the banks of the Kaiserin Augusta river, and also the coral terraces, are covered with tall grass instead of the customary forest. The fauna, very poor in quadrupeds, has only a few marsupials—among them the wallaby—and rodents, but the many varieties of the Bird of Paradise which are found are the most beautiful birds in the world, and only the large specimens of butterflies the country produces can vie with them in the splendour of their colouring. The cassowary has been met with, and the tufted pigeon as large as a goose is well known. Snakes are not very numerous, though mostly venomous. Large crocodiles are sometimes found in the rivers.

The Bismarck Archipelago, containing New Britain and New Ireland, forms a part of this South Sea colony, and is a name given to several groups of islands, of which the Solomons are one. Of these only the three largest belong to the archipelago. The only well-explored districts are the Gazelle Peninsula, which forms the northern part of New Britain (Neu Pommern), and the small islets of the Duke of York (Lauenburg) group. On the small coral islands some of the trading firms have their establishments; on the Gazelle Peninsula several plantations are carried on successfully. The soil is a rich loam formed of volcanic ashes, which spread over a large area after they had been ejected by the three now extinct volcanoes, which are the distinguishing features of this peninsula. New Britain offers greater facilities to European settlers than any of the other islands of the archipelago. Its coast-line is well indented with numerous bays, the mountains which fill the interior seem to be less precipitous, the valleys between them wider and easier of access than those of New Guinea. The other islands, though all of considerable size, are almost unapproachable, their coasts are steep and unbroken, and man is almost wilder than nature. Confirmed cannibals, the natives are nearly all very warlike, and offer strenuous opposition to all attempts at European ingress. Some islands have suffered from the Australian labour traffic. The natives in the

archipelago differ considerably from each other, according to the island which they inhabit. Three types can clearly be distinguished. The people of New Britain, of New Ireland (Neu Mecklenburg), and those of the Solomon Islands, who again divide into a darker and a lighter type. All again differ from the inhabitants of New Guinea, who are physically inferior. It seems probable that we have to deal with two races, a darker and a lighter one. In every small district a separate dialect is spoken, and so far as we know the people have no traditions which might point out their history. The islands of the archipelago are covered with primeval forest of a different character from that in New Guinea. The bread-fruit tree is found on the coral islands, almost all of which are fringed with a broad belt of coco-nut palms. The sago palm is common, timber less plentiful, the mango apparently wanting. Birds of Paradise are not found; cockatoos and several species of parrots are plentiful. Pigeons are found in immense flights, but certain kinds only inhabit certain islands. The bats, called flying-foxes, occur in thousands, and are eaten by the natives. The interior of these islands is probably the least known corner of the whole world.

Government. — The colony is directly administered by the Imperial German Government; but the development of its resources remains in the hands of the German New Guinea Company. *Friedrich Wilhelmshafen*, the best natural harbour in New Guinea, has developed into a permanent settlement. As this bay gives access to wide fertile plains there is no doubt that the settlement on its border has a future. Other ports of some promise are *Berlinhafen*, *Konstantinhafen* and *Finschhafen*.

FIG. 320.—*Flag of the German New Guinea Company.*

In the Bismarck Archipelago the chief settlements are Matupi, a small island in Blanche Bay, entirely occupied by the establishment of a successful trading firm. *Ralum* is a flourishing and steadily growing plantation, and *Herbertshöhe* is the seat of administration. All those localities are situated on the Gazelle peninsula, which is the centre of traffic. All other settlements are trading or missionary stations at which a few Europeans live in comparative solitude. Gold occurs in the Bismarck Range of New Guinea, but plantation products and mother-of-pearl are the chief exports.

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III.—DUTCH NEW GUINEA

By Dr. C. M. Kan,[1]
Professor of Geography in the University of Amsterdam.

Position and Exploration.—The western or Dutch half of New Guinea extends from about twenty miles south of the equator to 9° S., and from longitudes 131° to 141° E. It is larger than British and German New Guinea taken together. The voyages of the Dutch to New Guinea in the early days of the Dutch East India Company, undertaken by Willem Yansz, Carstensz, Pool, Tasman, Vink, and others, were limited to particular parts of the coast, such as Telokh Berau, and Onin. Torres Strait was long unknown, and the north coast of New Guinea was sought for north of the equator, the whole being looked upon as part of the great hypothetical southern continent. The explorers of the nineteenth century have outlined the coast and made preliminary surveys which allow it to be represented on maps with some approach to accuracy. Subsequently mission stations were established in Dorei and Geelvink Bay, and traders came from Banda, Ternate, and Celebes, while occasional visits of men-of-war extended the knowledge of the coast. Since 1858, several scientific travellers have visited the island, chief amongst them being Wallace, Bernstein, Meyer, Van Rosenberg, D'Albertis, Maklukho Maklay, Braam Morris, De Clercq and Horst. The interior still remains entirely unknown.

Surface.—The south coast may be divided into two parts, lying respectively west and east of Cape Buru, opposite Geelvink Bay. The western half is best known on account of the repeated surveys and thorough studies of Versteeg and De Clercq, and is characterised by off-lying islands, and three deep bays named MacCluer Gulf, Arguni and Etna Bays. A few small rivers, including the almost unknown Karufa, enter on this part of the coast, and a steep line of cliffs about fifty feet high, composed of coral limestone, sandstone and flints, commences in the neighbourhood of the flat Sebekar Bay, and is repeated further east between Arguni Bay and Cape Buru. The other half of the south coast is still very little known; for the most part it seems to be low with no deep bays, and is dangerous for navigation, and very difficult of approach even off the mouths of the rivers. On the north coast the eastern half from Humboldt Bay to Geelvink Bay is characterised by numerous small inlets, while the rivers, on account of the proximity of the coast mountains, are but little developed. The only important stream is the Amberno river, which flows from the Van Rees mountains in the far interior. In the western half the great incurve of Geelvink Bay contains a number of large and small islands, the largest, including Japen Island, extending in a double chain across the mouth of the bay, and further west the land has the form of a flat coastal plain backed by mountains which give rise to numerous small rivers. The only part of

[1] Translated from the German by the Editor.

this coast that is fairly well known is that in the neighbourhood of Dorei and Andai and where Meyer crossed the island opposite MacCluer Gulf.

The mountains and rivers are very imperfectly known. East of Arguni Bay, a range with an elevation of about 3,000 feet runs from Mount Genoffa (about 5,000 feet) in a north-easterly direction. Further east, in the interior, the long range of the Charles Louis mountains has been seen from the coast running west and east between the meridians of 135° and 138° E. They rise into plateau-like summits much higher than the coast range, and are often covered with clouds. The height, as measured from passing ships, appears to reach 12,000 and even 16,000 feet, but it is still uncertain whether they rise above the snow-line as has been reported. The coast mountains appear to be formed of a Tertiary limestone, and from the evidence of the pebbles in the river beds, the great mountains of the interior consist mainly of slates and sandstone with some volcanic rocks. On the north coast the Cyclops mountains (about 7,000 feet), near the newly discovered Santani Lake, are perhaps of volcanic origin. On account of the insuperable difficulties of the cataracts of the Amberno river the Van Rees mountains remain entirely unknown. Further west the edge of the central plateau approaches the coast. Along Geelvink Bay and in the Arfak mountains (about 10,000 feet), some great heights and isolated peaks occur, but they are scarcely known. Only the mouths of the rivers can be laid down on the maps; the breadth and depth of the mouth of the Oetanata appears to indicate that it is a river of some length. We are absolutely ignorant as to the connection, if any exists, between the mountains of Dutch New Guinea and the east of the island.

Climate, Flora and Fauna.—The central mountain chain acts not only as a watershed, but as a climatic boundary. The north coast, with a rainfall of about seventy inches per annum, receives most rain during the north-west monsoon, from November to April, the dry season lasting from June to September at the utmost. The seasons on the south coast are reversed, the rainy season occurring between July and September, during the south-east monsoon. The climate of the south coast is influenced by the proximity of the Australian continent, the direction of the coast line, and the latitude. The temperature is high at all times of the year, the average being 79° F., and the range is small. The natural vegetation of primeval forest, palms, lianas, acacias, &c., is transitional between the flora of the Malay Archipelago and that of Australia. The cultivated plants are rice, sugar-cane, maize, yams, bananas, bread-fruit, and the Massoi tree which supplies spices, medicine, and dyes. Amongst the land animals the most characteristic are the marsupials, including a tree-kangaroo, and amongst birds the Bird of Paradise is pre-eminent; indeed, out of eighteen species recognised by Wallace, no less than fourteen, including the most magnificent in plumage, belong to New Guinea and the neighbouring islands. The green pigeon and emu are also found. The trepang or bêche-de-mer occurs in about twenty varieties in the water off the coast

People and Government.—The population is small. The aborigines are Papuans mixed with Malays, as they are mixed with Polynesians in the east. The Mountain-Papuans, sometimes called *Alfurs*, are distinct from the coast-dwellers, and from the inhabitants of the more eastern part of the possession, who are well known for their savagery and cruelty.

On August 24, 1828, the western half of New Guinea, over which the Sultan of Tidore claimed a certain jurisdiction, was placed under Dutch protection by proclamation, and the post of Merkusoord was established along with Fort Dubus (which was given up in 1838), and in 1848 the boundaries and the relations with the Sultan were revised. The occupation is practically limited to the occasional visits of Dutch war-vessels to the coast for the prevention of intertribal war, and the protection of the few trading and missionary stations. Quite recently a post has been established under a Dutch official (*Controleur*). There are trading and mission stations at *Sorong* on the west coast opposite Salawati, *Sekar*, *Skroë* on or near MacCluer Gulf, and *Sileraki* near the eastern boundary. On the north coast *Dorei*, and *Mansinam* in the north-west of Geelvink Bay are mission stations, while *Roon* and *Ansoes* on the island of Japen are trading posts. All these stations are regular calling places of the trading vessels which ply along the coast as far as Humboldt Bay.

STATISTICS *(Estimates)*.

Area of Dutch New Guinea in square miles..	..	..	..	..	..	..	151,800
Population „ „ (rough estimate)	..	..	..	..	..	..	200,000

STANDARD BOOKS.

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IV.—NEW CALEDONIA

By Professor Augustin Bernard,[1]
Algiers.

Position and Configuration.—New Caledonia (*Nouvelle Calédonie*) is almost equally distant from Australia (900 miles east) and from New Zealand (970 miles north-west), and New Guinea (1,100 miles south-east). Its form is that of an elongated ellipse, lying north-west and south-east, with a length of about 250 miles and a breadth of only 25 to 30. It is prolonged on the north by the Belep Islands and on the south by the Isle of Pines. Archæan rocks occupy the north-east; Triassic and Cretaceous strata form a narrow band along the west coast, and eruptive rocks,

FIG. 321.—*New Caledonia.*

[1] Translated from the French by the Editor.

principally Serpentine, are greatly developed, covering two-thirds of the island. The surface is essentially mountainous, as, although of no great height (Mont Panié, 5,400 feet, and Mont Humboldt, 5,360 feet, are the highest summits), the slopes are steep and the country very broken, particularly in the north where two mountain ridges frame the valley of the Diahot, the only important river. Every variety of coral reef is found along the coast; the great barrier reef, which is second only to that of Australia, surrounds the east and west coasts and is continued to the north for more than 150 miles from the land. The chain of the Loyalty Islands (Uvea, Lifu and Mare) is formed entirely of masses of dead coral, and lies parallel to New Caledonia, separated by a channel 50 miles wide.

Climate and Vegetation.—The climate of New Caledonia is characterised by a rainy season in summer (December to May), and a comparatively dry and cool season for the rest of the year; but the seasons are not very sharply separated, and no month is absolutely rainless. The average rainfall at Noumea, in the south, is 45 inches per annum, which is less than that of most of the Pacific islands. The vegetation, like the climate, resembles in part that of Australia and in part that of the New Hebrides. Bush, analogous to the Australian scrub, covers at least half of the island; the rest is occupied by grassy pastures and by the niaouli (*Melaleuca leucadendron*), the most characteristic tree of New Caledonia, which takes the same place in its vegetation as the eucalyptus in that of Australia. Although the island lies wholly in the tropics, tropical forests in the strict sense of the word occupy only a small area.

People.—The basis of the population of the archipelago is a woolly-haired dolichocephalic Melanesian race, to which a small proportion of mesocephalic light-complexioned Polynesians with almost straight hair has been recently added. As in all the Pacific Islands these natives, called *kanakas*, are rapidly diminishing in number.

New Caledonia was discovered by Cook in 1774, and was annexed by the French in 1853. Although acclimatisation is easy for Europeans there are as yet scarcely 8,000 free colonists, leaving the military guards and the officials out of account, of which the half live in Noumea and its neighbourhood. The slow rate of progress is due to the transportation system, which has produced only bad results; the public works carried out by the convicts are insignificant, the concessions of land which have been made to them have scarcely succeeded, and the liberated prisoners infest the country. Now, however, the situation tends to improve; successful efforts have been made to attract free cultivators and to reduce the number of convicts, from whose presence there is reason to hope the island may soon be entirely relieved.

Resources and Trade.—The principal vegetable produce of the island is coffee, which succeeds well, and the area of the plantations is being extended. Sugar-cane, tobacco, vanilla, pine-apples, bananas, maize, and manioc, are also cultivated. Stock-rearing, not however carried on

in the Australian manner on account of the limited area of the pastures, forest produce, and fisheries all have a certain importance.

The mineral resources of New Caledonia are particularly rich ; gold and copper occur amongst the primitive rocks, mines of iron, chromium, cobalt and nickel are worked in the serpentines, and coal occurs in the Cretaceous strata. Hitherto nickel-ore only has been largely worked, and this industry has undergone frequent crises on account of the lowering of the price by the competition of other producing countries, especially of Canada. The condition of the industry will be improved by the erection on the spot of reducing furnaces which will diminish the weight of the cargoes by about 92 per cent. and increase their value. As yet there are few roads, but the means of transport are improving. A service of local steamers connects the capital with various points on the east and west coasts. Monthly steamers of the Messageries Maritimes run between Noumea and Marseilles, calling at Sydney and Melbourne, and make the passage in 38 days. A submarine cable also unites New Caledonia with Australia and the rest of the world. *Noumea*, the capital, has an excellent harbour sheltered by the island of Nou and the peninsula of Ducos. The future prospects of New Caledonia are good on account of its wealth in coffee and nickel, and the prospect of free colonisation taking the place of the present convict system.

STATISTICS.

Area of New Caledonia and Loyalty Islands (square miles)	7,150
Population " " " "	52,000
Density of population per square mile	7
Population of Noumea	4,600

ANNUAL TRADE *(in pounds sterling).*

	Average 1871-75.	1881-85.	1891-95.
Exports	32,000	200,000	280,000
Imports	360,000	320,000	480,000

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V.—SMALLER MELANESIAN ISLANDS

BY THE EDITOR.[1]

New Hebrides.—The New Hebrides, including the Banks and Torres groups, stretch north-west and south-east for about 480 miles between 13° and 20½° S. Some of the islands are of coral, and others of volcanic formation, mountainous and extremely fertile. The bread-fruit, coco-nut, banana, sago-palm, sugar-cane, nutmeg and other tropical pro-

[1] Assisted by E, J. Hastings.

ductions flourish. Fish, pearl-shells, bêche-de-mer, and tortoise-shell are obtained on the coasts. The natives are mainly of the Papuan or Melanesian race, but Polynesians are found on some of the islands, and many different languages are spoken in the group. Most of the people are still heathen, and cannibalism is not yet extinct. The islands were discovered in 1606 by Quiros, and explored in 1774 by Captain Cook. Espiritu Santo, the largest island, rises to about 5,500 feet, is densely wooded and intersected by deep ravines. Antumey (Annatom) is the most southerly of the group, and the one in which missionary effort has been most successful. Ambrym and Tanna have active volcanoes, the eruptions of which are sometimes very destructive. The New Hebrides have long been a favourite recruiting-ground for the labour-traffic, the natives (*kanakas*) contracting to work on the Queensland plantations for a term of years.

Santa Cruz.—This group, crossed by the parallel of 10° S., lying north of the New Hebrides and east of the Solomon Islands, was discovered in 1595 by Mendaña, who named it Santa Cruz. Forgotten for nearly two centuries, the islands were rediscovered by Carteret, who named them after Queen Charlotte. They are of volcanic and coral formation, and surrounded by coral reefs. The inhabitants belong to the Polynesian race intermixed with the Melanesian; they are of good physique, dwell in large villages, and surround their houses with stone fences. Agriculture and fishing are their chief occupations, and the men are hardy sailors. The climate is humid; both the north-west and the south-east monsoons bring rain. Santa Cruz, the largest island, occupies more than half of the total area. Vanikoro, the most southerly, is the best known.

Solomon Islands.—The Solomon Islands, forming an archipelago comprising twelve larger islands or groups, and numerous smaller ones, extend north-west for about 600 miles, between the parallels of 5° and 11° S. from near Santa Cruz to the Bismarck Archipelago. They contain examples of the typical low coral and lofty volcanic islands, the latter rising in several points to 4,000 feet and over, and in the island of Bougainville to 10,000 feet. The islands are in general surrounded by coral reefs, and there are several good harbours. Much of the surface is covered with dense forest, and, in many instances, belts of mangrove border the coast. The soil is fertile, the yam, bread-fruit, banana, taro, betel-nut, pepper and coco-nut are widely cultivated. The fauna combines Melanesian and Polynesian types. Anthropoid apes are said by the natives to inhabit the woods, but this statement lacks confirmation; crocodiles are numerous, and this is the most easterly group in which they are found. The inhabitants belong mainly to the Melanesian race, with an admixture of Polynesian elements; they are skilled in carving and in the construction of canoes; but are still mostly in a savage condition, and cannibalism is practised. In the interior other inhabitants, probably a Negrito people,

known to the English traders as Bushmen, are in course of being exterminated by the Melanesians. The climate is rather unhealthy; temperature ranges between about 75° and 90° F., and the prevailing winds are the north-west and south-east monsoons; the rainfall considerably exceeds 100 inches. The islands were discovered by Mendaña in 1567, but they remained almost unknown for two centuries, when they were visited successively by Carteret and Bougainville. The people are ruled by native chiefs, but the most northerly and largest island in the group, Bougainville Island, is a German possession, and the remaining islands are all British. The principal islands of the British group are Choiseul, and Isabel. The others are Rennell, San Christoval (Bauro), with one of the best harbours in the group, Ugi, with a British coaling station, Guadalcanar, which rises in Mount Lammas to 8,000 feet, New Georgia (Kausagi), and Malaita or Mala Island.

STATISTICS AND STANDARD BOOKS.

See end of Chapter XXXVI.

CHAPTER XXXVI.—THE ISLANDS OF THE PACIFIC OCEAN

By the Editor.[1]

I.—GENERAL

General Description.—The islands of the Pacific Ocean, or South Sea, are sometimes grouped together with Australia, sometimes without that continent under the name *Oceania*. They are divided by different geographers into various subdivisions, that most widely adopted being into *Micronesia*, or the Small Islands in the west, north of the latitude of New Guinea, *Melanesia*, or the Islands of the Blacks between New Guinea and Fiji, and *Polynesia* or the Many Islands scattered over the rest of the ocean, and inhabited by a race of men wonderfully homogeneous when one considers the vastness of the area of dispersal and the smallness and isolation of the scattered island-homes. The whole land area of all these islands—New Zealand excepted—is only about 60,000 square miles. Except for a mistake as to the extent of scientific knowledge regarding the coral polyp, the description of this region by Robert Louis Stevenson in his book "In the South Seas," is true as well as graphic :—

"That wide field of ocean, called loosely the South Seas, extends from tropic to tropic, and from perhaps 120° W. to 150° E., a parallelogram of one hundred degrees by forty-seven, where degrees are the most spacious. Much of it lies vacant ; much is closely sown with isles, and the isles are of two sorts. No distinction is so continually dwelt upon in South Sea talk as that between the 'low' and the 'high' island, and there is none more broadly marked in nature. The Himalayas are not more different from the Sahara. On the one hand, and chiefly in groups of from eight to a dozen, volcanic islands rise above the sea ; few reach an altitude of less than 4,000 feet ; one exceeds 13,000 ; their tops are often obscured in cloud ; they are all clothed with various forests, all abound in food, and are all remarkable for picturesque and solemn scenery. On the other hand, we have the atoll ; a thing of problematic origin and history, the reputed creature of an insect apparently unidentified ; rudely annular in shape ; enclosing a lagoon ; rarely extending beyond a quarter of a mile at its chief width ; often rising at its highest point to less than the stature of a man—man himself, the rat and the land-crab, its chief inhabitants ; not more variously supplied with plants ; and offering to the eye, even when perfect, only a rim of glittering beach and verdant foliage, enclosing and enclosed by the blue sea." The ring of the atoll may be of any

[1] Assisted by E. J. Hastings.

diameter from a few hundred yards to many miles ; it is always narrow, composed of broken blocks of coral and without a blade of grass. Monotony of surface is broken by groves of the coco-nut palm, "that giraffe of vegetables, so graceful, so ungainly." The narrow rim is often partially submerged, so that instead of an annular strip the atoll becomes a ring of islets surrounding a lagoon with several entrances. But the grand contrast in all low coral islands is that of the two beaches, the inner beach facing the lagoon, which is the harbour and the site of all houses, and the outer beach on which the ocean surf always thunders, filling the whole island with its unceasing noise, and this beach is deserted, shunned by the natives as the haunt of the spirits of the dead.

The Island Groups.—Although the Pacific appears on the map to be thickly sprinkled with islands, these are really grouped along certain lines, with vast vacant breadths of sea between, and it is to be remembered that Magellan, when he left the Strait which bears his name and ventured for the first time on the unknown waters of the Pacific, crossed the whole breadth of the ocean, and in three months of voyaging saw no land except one barren and waterless rock. Speaking generally, the depth of the Pacific appears to exceed 2,000 fathoms from 80° W., close to the coast of South America, to 180° W. Across the western half of this vast abyss a narrow rise runs in the latitude of the northern tropic roughly from east-south-east to west-north-west, and upon it the volcanic islands of Hawaii appear. A broader and much longer rise, edged by smaller parallel ridges, stretches east and west along the southern tropic, bearing the innumerable atolls of the Paumotu, or Low Archipelago, the Society Islands and Cook Islands. Smaller scattered elevations of the sea-bed occur to the north and north-west, each bearing a cluster of islets—including the Marquesas, and some smaller groups. The less deep water east of Australia and of the Malay Archipelago is traversed by two great rises, curved nearly parallel to the coast, and each studded by a chain of island groups. The outer line taking a bold sweep at first north-eastward from New Zealand forms the foundation whence spring the Fiji and Friendly Islands and the

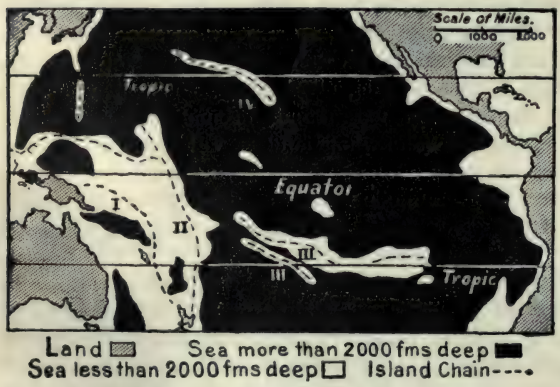

FIG. 322.—*The Island Chains of the Pacific.*

Samoa group (in 12° S.); thence wheeling north-westward, it bears in succession the Ellice Islands, and the Micronesian archipelagoes consisting of the Gilbert group (on the equator), the Marshall Islands and the Carolines, and the rise finally curves inwards towards Jilolo. In 145° E. another rise branches off northward towards Japan, bearing the Marianne or Ladrone Islands, also included in Micronesia. The inner rise, which also starts from New Zealand, forms a sharper north-westerly curve, and its course may be traced on a map by New Caledonia, the New Hebrides, the Solomon Islands, and the Bismarck Archipelago, for all of which it forms the foundation. It terminates in New Guinea. The more important islands of the Pacific (Fig. 322) may thus be treated as belonging to (i.) the Inner or Melanesian Chain, (ii.) the Outer or Micronesian Chain, (iii.) the South Tropical or Paumotu Chain, and (iv.) the North Tropical or Hawaiian Chain. As a matter of convenience the islands of the Melanesian chain were considered with New Guinea.

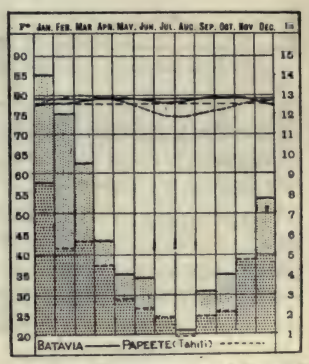

FIG. 323.—*Temperature and Rainfall at Batavia and Papeete.*

Political Divisions.—Amongst the scattered groups and islands in the Pacific forming British possessions are Fiji, the Solomon Islands (southern), Santa Cruz, Gilbert Islands, Ellice Islands, Phœnix Islands, Union Islands, Tonga or Friendly Islands, Cook Islands, Manihiki group, Pitcairn Island, besides many others, some mere rocks, and uninhabited. These are under the jurisdiction of the High Commissioner of the Western Pacific, whose authority extends over all lands in the western Pacific, not being dependencies of any of the British Colonies or of any other civilised Power. The only important unattached group is that of the New Hebrides, controlled by a joint British and French commission. The French possessions come next in number and importance, including New Caledonia, the Loyalty Islands, the Marquesas group, the Society Islands, with Tahiti, and most of the islands of the South Tropical Chain. The total area does not exceed that of a small French department, and their total population is under 29,000. The islands administered by Germany include the Bismarck Archipelago and Bougainville Island in the Melanesian Chain, the Marshall, Caroline, and Marianne Islands in the Micronesian Chain, and part of Samoa. The United States are responsible for Guam in the Marianne Islands, part of Samoa and Hawaii. A few of the islands in the Eastern Pacific belong to South American countries.

II.—FIJI

Position and Extent.—The Fiji Islands, a scattered group about 2,000 miles east of Queensland, consist of two large and a great number

of small islands, islets, and rocks, lying between 15° and 22° S., and traversed by the 180th meridian. The island of Rotuma, in 12° S. and 177° E., is a dependency of Fiji.

General Description.—The two largest islands, Viti Levu and Vanua Levu, lie on the west and north-west of the group, separated from the cluster of small islands called the Lakemba group, on the east, by the islet-starred water of the Goro or Karo Sea. Most of the islands are surrounded by barrier reefs, which form admirable natural breakwaters, crossed by deep channels, giving access to the enclosed harbours and roadsteads. The larger islands, all composed of volcanic rock, are mountainous, with summits rising to or even exceeding 4,000 feet. Numerous streams descend from the mountains and are utilised by the natives for irrigation. Earthquakes are not uncommon, and the great sea-waves which often follow them sometimes cause great destruction on the low shores. The scenery is in many parts grand and picturesque. There are no large native animals. Cattle have been introduced, and many now run wild. Turtle and pearl-shell are obtained on the reefs, and fish off the coasts. Dense forests clothe the windward side of the islands, where the south-east trade-winds bring a copious rainfall. The coco-nut, banana, pineapple, and many tropical fruits flourish. Sugar-cane is the chief plantation product, but rice and maize are widely grown, and the taro and yam form the principal native foods.

FIG. 324.—*The Fiji Islands.*

People, History, Government and Trade.—The Fijians belong to the Polynesian race, are of a dark copper colour, well-built and handsome. Their numbers have greatly decreased since the advent of Europeans, and in 1875 about one-third of the population was carried off by a terrible epidemic of measles. The islands were discovered by Tasman in 1643. In 1835 the Wesleyan missionaries commenced their labours amongst the islanders, many of whom were then cannibals; and now Christianity is professed by all the inhabitants. The first British consul was appointed in 1859; in 1864 the leading chiefs offered to cede the sovereignty, but it was not until 1874 that the islands were taken over by the British Government, and shortly afterwards constituted a Crown colony. The Governor is assisted by an Executive and a Legislative Council, and the local administration is carried out by native chiefs. Native labour is insufficient for the increasing plantations, and labourers have to be imported from other islands. The

FIG. 325.—*The Badge of the Crown Colony of Fiji.*

leading exports are sugar, copra and fruit, especially bananas. The principal imports are cotton goods, machinery and hardware, and food-stuffs. Trade is carried on chiefly with the United Kingdom and the Australian Commonwealth.

Suva, the capital, situated on the south of Viti Levu, is a small town with a good harbour. *Levuka*, on the small island of Ovalu, east of Viti Levu, the former capital and a port, occupies a narrow coast-strip backed by mountains rising almost perpendicularly to over 2,000 feet.

STATISTICS OF FIJI.

	1881.	1891.	1901.
Area of Fiji (square miles)	7,740 ..	7,740 ..	7,740
Total Population of Fiji	127,095 ..	121,180 ..	117,870
Number of Native Fijians	114,748 ..	100,321 ..	94,397
Density of Population per square mile ..	16·4 ..	15·7 ..	15·2

ANNUAL TRADE OF FIJI (*in pounds sterling*).

	1875-79.	1881-85.	1891-95.
Imports..	125,000 ..	365,000 ..	279,000
Exports..	140,000 ..	278,000 ..	436,000

III.—THE MICRONESIAN CHAIN

Friendly Islands.—To the east of Fiji, and clustered round the parallel of 20° S., several small clusters of high and low islands, some atolls, and one an active volcano, were discovered by Tasman in 1643. Their present English name is due to Cook, who wished to preserve the memory of his kindly reception by the natives. The native name is Tonga, or, in the new spelling, *Toga*, for the local chiefs are all subject to the King of Tonga, who resides in Tonga-tabu, the largest island of the group. The climate is hot, oppressive and humid, and hurricanes frequently occur in February and March. Yams, bananas, coffee, coco-nuts and arrowroot are amongst the chief productions; but copra—dried coco-nut—is practically the only export. New South Wales and New Zealand send most of the imports. The people are Polynesians, and most of them now profess Christianity. The islands are under British protection.

Samoa.—The Navigator or Samoan Islands, lying near 14° S. and 172° W., have become more known than most of the neighbouring groups because they lie in the direct line of the mail steamers between Australia or New Zealand and Hawaii on the way to the western ports of North America. The islands are of the usual high or low type, and usually surrounded by a barrier reef. The lofty slopes facing the south-east trades are well watered and luxuriantly fertile; and the climate, although hot, is not of the worst. Disastrous hurricanes occur, and none of the harbours, otherwise good, are safe from their fury. The productions resemble those of other tropical Pacific islands, copra being the chief. The trade is in the hands of British, American and German firms; but the islands, which were for a time under the control of the consuls of the United

Kingdom, the United States, and Germany, are now divided. Upolu and Savaii form a German possession ; the capital is at *Apia*, which has a fair harbour on Upolu. Tutuila, with its adjacent small islands, is a possession of the United States, and contains the best harbour in the group at *Pago-pago*. The people are amongst the least spoiled of the Pacific folk in spite of the measure of civilisation they have assimilated ; they are feelingly described by Robert Louis Stevenson, who spent his last years in Samoa.

Ellice and Gilbert Groups.—The Ellice or Lagoon Islands to the north-west of Samoa stretch for 360 miles between 11° and 5° S. They consist of nine large atolls or ring-like clusters of low coral islands, and on account of the typical forms assumed by the atoll of Funafuti it has been made the subject of an interesting experiment in physical geography. The Royal Society of London and the Government of New South Wales sent out an expedition in several successive years to put down a deep bore-hole through the coral in order to discover the nature of the underlying rocks and so to test the rival theories as to the origin of coral islands. Although the bore was carried down 1,200 feet no rock but coral was found. The people of the Ellice group are for the most part Christian Polynesians, governed by their own chiefs, under British protection.

The Ellice group is followed on the Outer Australasian Curve by the Gilbert or Kingsmill Islands, a line of atolls and low coral islets which follows the same trend and crosses the equator. The chief trees on these islands are the coco-nut and pandanus, but the soil is less fertile than in most of the Polynesian groups. The inhabitants are active and intelligent ; and they retain practical independence under the rule of their own chiefs, supported by British protection.

The Marshall Islands.[1]—This group is formed by a number of coral reefs, or atolls, with a total area of 160 square miles, which run in two nearly parallel rows from north-west to south-east, and extend over 9 degrees of latitude, with their centre about 7½° N. The eastern line of 15 atolls is called the Radak, the western containing 18, the Rälik group. The islands, pure coral formations, are of very small size ; they rise only a few feet above the surface of the sea, and only on one has the wind heaped up so much sand that it forms an elevation which might be called a hill. Each atoll, though of most irregular shape, encloses a deep lagoon, into which ships can enter through passages between the islands. On none of them is there any deep soil ; a thin layer of earth has been formed by the decay of vegetation, in which the coco-nut palm stands most prominent. Bread-fruit trees, various kinds of pandanus, bananas, and a fibrous plant which is used for mat making, nearly complete the flora. Taro is grown for food. The fauna is very poor. Fish and crustacea abound in the lagoons and on the reefs, where the natives catch them in large quantities as the only animal component of their chiefly vegetable diet. The climate is hot and

[1] By Graf von Pfeil.

very moist, the rainfall being nearly the same in all months of the year, with the exception of perhaps January and February, which are drier. It is remarkable that, although these islands are in the northern hemisphere, the warmest month in the year is January and the coolest July. The inhabitants are Micronesians, their colour varies between lighter and darker shades of coffee-colour; they are well grown, and their features are pleasant. Great navigators, they construct curious charts with little sticks, but these are not intelligible to Europeans. The population is increasing. The islands form a German colony, and the Landeshauptmann stands at the head of the administration, the expense of which is defrayed by the Jaluit trading company.

Caroline Archipelago.—The Caroline Archipelago, including the Pelew Islands, stretches from east to west between the equator and 10° N., and consists of about thirty-five groups. Some of the islands are volcanic, but most of coral origin, and all surrounded by reefs. They are generally well-wooded and fertile; their products being the usual wealth of cocoanuts, bread-fruit, bananas, pine-apples, taro, and yams. The inhabitants, who are called Micronesian, are of a very mixed descent. They are governed by their own kings or chiefs. The Caroline Islands were discovered by the Portuguese in 1526, and in 1686 taken by the Spaniards and named after Charles II. of Spain; but they were little known to Europeans before the nineteenth century. The Pelew group had, however, previously acquired an honourable name through the kindness shown by the inhabitants to the crew of the *Antelope* wrecked in 1783. In 1899 the Caroline Archipelago and the Ladrones were sold by the Spanish government to Germany. Although so near the equator, the climate is pleasant, the heat being tempered by sea-breezes. The volcanic island of Ponape in the east is the largest of the archipelago, with a good harbour at *Kiti*. The central Truk, or Hogolu Islands, form the largest group. Yap, or Guap, is the most important island in the west. These islands contain a number of remains of an ancient people skilled in the building of cyclopean masonry, but as yet presenting an unsolved problem as to their origin, the period when their great works were carried out, and their ultimate fate.

Ladrones.—The Marianne or Ladrone Islands run north between 13° and 21° N. along the meridian of 145° E. They include two distinct groups: a northern, containing ten high volcanic islands, with still active volcanoes; and a southern, with five low coral islands. The flora has been modified by the introduction of plants from the Philippines. Maize is the principal cereal; but potatoes, yams, sugar-cane, and various fruits are also cultivated. The aboriginal inhabitants—Chamorros of Indonesian origin—scarcely exist now as a distinct race, owing to admixture with Talages from the Philippines, and Spanish. The climate is healthy, and, although two seasons are recognised, the rainfall is distributed throughout the year. Destructive hurricanes sometimes occur, and slight earthquakes are frequent. The islands were the first discovered by Magellan in 1521,

and called, from the habits of the people, Ladrones or Robbers. In 1688 they were taken possession of by the Spaniards, and re-named after the Empress Marie Anne of Austria. Guam is the largest island of the archipelago, occupying more than half of the total area and containing most of the population. The coasts are mostly rock-bound; but the port of *San Luis de Apra*, or *Caldera*, is the best in the archipelago, and on the island is *Agaña*, the principal town. The name of Guam has acquired a curious significance for Pacific traders wishing to keep their destination secret, often clear from Australian ports for Guam, the most distant harbour among the islands, and one to which there are many routes. It belongs to the United States; the rest of the Mariannes are German.

IV.—SOUTHERN POLYNESIA

Cook and Tubuai Islands.—A narrow line of small rises running from 18° to 28° S., parallel to the wider elevation of the ocean-bed which bears the Low Archipelago, is crowned by the volcanic groups of the Cook Islands in the north-west and the Tubuai Islands in the south-east. The people, who exhibit Malay affinities, are darker in complexion than the Tahitians. The mountainous islands are fertile, producing the plantation products common to the latitude and the soil. Government is administered through native chiefs, though under the superintendence of European Powers. The Cook or Hervey Islands are now annexed to the colony of New Zealand. Raratonga is the largest (thirty square miles) and most picturesque of the islands, a volcanic mountain richly wooded and surrounded by a coral reef. The Tubuai or Austral Islands, five in number, are French possessions.

The Society Islands.—The broad band of island groups, which stretches between 10° S., and the tropic of Capricorn, from 155° W. to 130° W., forms several groups, some of which have been under French protection since 1842, and almost all are now administered by the French. The Society Islands, lying between 16° and 18° S., form the most important groups in the South Pacific. They comprise Tahiti and many smaller islands arranged in two groups, the Windward, and the Leeward. They are all volcanic and mountainous, well watered by numerous streams, densely wooded, and surrounded by coral reefs. Copra and mother-of-pearl are the chief commercial products; but coco-nut-oil, cotton, vanilla, oranges, and an edible fungus much appreciated by the Chinese, are exported. The inhabitants belong to the Polynesian race.

Tahiti was discovered by Quiros in 1606 and named La Sagittaria; in 1767 it was re-discovered by Captain Wallis, who gave it the name of King George Island, but its native name, formerly spelled Otaheite, is now alone used. Tahiti was Captain Cook's favourite centre when exploring the Pacific, and here he observed the Transit of Venus on his first great voyage of circumnavigation in 1769. On this occasion he gave the name

of Society Islands in honour of the Royal Society of London. English missionaries settled in the island in 1797 and met with some success for a time. A French protectorate was declared in 1842, and subsequently in 1880 the two groups were formally annexed by France. *Tahiti* consists of two mountainous peninsulas united by an isthmus. The coasts are low, but the central parts of the islands are traversed by a ridge of mountains whose highest summit approaches 7,500 feet. From this ridge wooded spurs extend on each side, enclosing fertile plains and valleys. Matavai Bay, in the north of the island, is the best harbour, but there are several others. *Papeete*, the capital and seat of government of French Oceania, is a modern town picturesquely situated at the foot of mountains on the north-west, and surrounded by groves of coco-nut, orange and guava trees. Point Venus, the most northerly point in the island, was the station for observing the Transit of Venus in 1769. Owing to the many observations which have been made, its longitude, 149° 28′ 21″ E., is said to be the most certainly determined in the Pacific.

FIG. 326.—*Tahiti, a typical high island.*

Low Archipelago.—The Tuamotu, Panmotu, or Low Archipelago, contains about eighty low coral islands and numerous islets lying between 14° and 24° S. to the east of the Society Islands. The inhabitants, who are under French administration, belong to different branches of the Polynesian race; some resemble the Fijians, others the Tahitians. They are honest, industrious and thrifty, qualities which often distinguish the dwellers on coral islands where hard work is necessary for a livelihood from the lazy and careless inhabitants of the fertile volcanic islands, where life is easy. There is considerable trade in copra, pearl-shell, and pearls. Anaa, discovered by Cook in 1769, is one of the smallest but most populous of the group, well cultivated and yielding about one-fourth of the exports. Huo Island was discovered by Bougainville in 1768, and it is interesting as having been the scene of some early investigations on the structure of coral islands carried on by Sir Edward Belcher.

FIG. 327.—*Fakarava, a typical atoll or low island. Dry land black, partially submerged reef dotted. The atoll measures 40 miles by 15.*

Fakarava, the atoll on which *Rotoava*, the capital of the archipelago, is situated, owes this distinction to the fact that its lagoon has two good channels—one to windward, the other to leeward—so that the small sailing-vessels which carry on the trade of these islands can enter and leave with a fair wind.

The Manga Reva or Gambier Islands are a small group of French islands lying south-east of the Low Archipelago, with which they are sometimes included.

V.—SCATTERED GROUPS

Marquesas.—The two groups forming the Marquesas or Mendaña Islands lie between 8° and 10½° S. The islands are of volcanic formation, mountainous and rugged, intersected by ravines and valleys of exquisite beauty, and generally fertile. The soil is well adapted for the growth of cotton, which, with a fungus for the Chinese market, forms the principal export. The natives keep a good many cattle. The climate is sultry, the temperature seldom falling below 73°, but the islands are nevertheless healthy. The inhabitants are of the Polynesian race and nearly allied to the Tahitians ; their moral standard is very low, worse than in the old days of heathenism, and the European vices and diseases, which are rapidly killing them off, have become subordinate to the Chinese vice of opium-eating. Formerly the natives of the Marquesas were celebrated above all Polynesians for the beauty of the tattooing with which they ornamented their whole bodies. Some of the islands were discovered by Mendaña in 1595 ; the others by Cook in 1774. They were taken possession of by France in 1842. Nuka-Hiva is the largest island of the archipelago ; it affords the best anchorage in the bay where *Tai-o-hae*, the seat of the French Resident, is situated.

Central Groups.—Between the Society Islands and Hawaii the bed of the ocean rises in a series of isolated elevations forming a line directed towards the north, and each is crowned by one or several islands of the familiar Polynesian type. The scattered coral Manihiki islands lie about 10° S., and of them Penrhyn Island, the largest of the group, is the only one regularly inhabited, the people living by pearl-shell fishing ; the others are only visited occasionally by collectors of coco-nut produce and guano. Malden, Jervis, Christmas, Fanning, and Palmyra Islands carry on the chain, the last named being situated in about 6° N. The whole are now under British protection.

Juan Fernandez Islands, situated near 34° S., between 400 and 500 miles from Valparaiso, were discovered by Juan Fernandez about 1563. The largest island, Mas a Tierra, is famous for the five years' residence of Alexander Selkirk, the possible original of Robinson Crusoe. The islands now form a Chilean possession.

Galapagos Islands.—On the equator, in 90° W., the volcanic group of the Galapagos (*i.e.* Tortoise) Islands lies at a distance of 750 miles from the coast of Ecuador, to which country they were annexed in 1832. Albemarle, the largest island, is sixty miles in length, and there are four other islands of fair size, and eight smaller. The climate is cooler than that of any other equatorial land at sea-level, on account of the

reduction of temperature by the Humboldt current. The lower ground of the islands suffers from want of rain, which, however, falls in sufficient quantity on the higher slopes, and some plantations are worked. The flora and fauna of the islands are peculiar. No palms of any kind grow on them, and out of about 400 species of plants which have been found, nearly 200 are absolutely confined to this group. All the reptiles are without representatives elsewhere; but the giant tortoise, from which the islands took their Spanish name, is likely to become extinct if not protected; it has already vanished from some of the islands. Very large turtles frequent the coasts. Amongst the birds there are some sea-fowl of antarctic species, another result of the cool current from the south.

Pitcairn Island.—Pitcairn Island in 25° S. and east of the Low Archipelago, is a small mountainous and rock-bound but fertile island. Bounty Bay, one of the two possible landing-places for boats, is the place where vessels communicate with the inhabitants by means of their canoes. Yams and potatoes form the staple food of the islanders. There are no springs on the island, and the water supply is derived from rain. The island was discovered by Carteret in 1767. In 1789 some of the *Bounty* mutineers with Tahitian wives reached it, and remained absolutely unknown to the outside world for twenty years. Owing to the resources of the island becoming inadequate for the growing population, then numbering nearly two hundred, they were, by agreement, removed in 1856 to Norfolk Island. Some of these, however, returned to Pitcairn Island, in 1859 and 1864, where they and their descendants remain, now numbering 140 persons.

Easter Island.—The remotest islet of Polynesia, far to the east of every other group, is Easter Island, or *Rapa Nui*, in about 27° S. and 109½° W. It lies 2,030 miles west of the coast of Chile, to which it belongs. It is of volcanic origin, triangular in form, highest in the north, where it reaches 1,970 feet, and contains several distinct craters. Cook's Bay or Hanga river on the west is the principal anchorage, and round it the inhabitants chiefly dwell. The vegetation is scanty, and there are no trees, though the soil appears to be not infertile. The climate is temperate and healthy. The island is remarkable, for in spite of its overpowering isolation, it harbours a clue to the migrations of an earlier and vanished race of men, whose colossal works are also found in the Carolines, 7,500 miles away at the opposite corner of the island world. These take the form of sculptures, including numerous gigantic stone busts carved out of trachyte, sculptured stones and a number of well-preserved stone houses of unguessed antiquity. No existing Polynesian race is competent to produce such work. According to native tradition, their ancestors came from Rapa, 1,900 miles to the west, in two large canoes. Easter Island was discovered by Roggewein on Easter Sunday, 1721—hence its European name. During the first

half of the nineteenth century, the population numbered about 3,000 divided into tribes, and ruled by an elected king. In 1863 a party of Peruvians carried off nearly half the population to work the guano in the Chincha Islands. There many died, and of those who were sent back the few survivors brought with them diseases which have since caused great ravages. Hence the population has rapidly decreased and is now small. A Tahitian firm has formed a station on the island, and large numbers of cattle and sheep are being raised.

VI.—HAWAII

Northern Tropical Chain.—Hawaii, formerly called the Sandwich Islands, stands on the long narrow rise which runs across the centre of the North Pacific Ocean. The actual island chain (Fig. 328) extends for 340 miles from west-north-west to east-south-east between the parallels of 19° and 22° N. and the meridans of 155° and 160° W. North of the main group, a slender chain of uninhabited islets and rocks stretches west by north for about 1,350 miles.

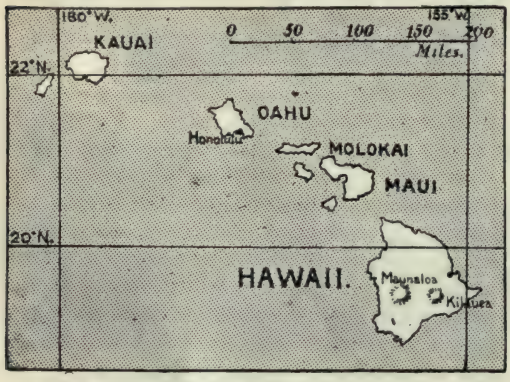

FIG. 328.—*The Hawaiian Islands.*

Character of the Land. — The islands rise abruptly from deep water, for the oceanic rise whence they spring is an elevation only when compared with the enormously deep abysses surrounding it. The coasts are usually steep and uniform, with occasional narrow strips of beach, but having few openings where ships may find shelter. The whole group is purely volcanic, and contains the loftiest summits of any oceanic islands, the cones of Mauna Loa and Mauna Kea, in Hawaii, soaring to the majestic height of close on 14,000 feet. Valleys and deep gorges, eroded by the ample rainfall, intersect the slopes, and wide areas even of the more level ground are covered with the lava outpoured in successive eruptions. The subterranean forces are extinct in the western section of the islands, but in the eastern they are still fiercely active and present the most colossal workings of volcanic energy known on the surface of the Earth. Much of the surface water sinks through the porous soil, forming springs at lower levels; and small streams vivify the surface in every island. The scenery is

varied; in parts wild, rugged and bare; elsewhere softened by rich forests, the picturesque valleys adorned with a rich variety of ferns; and the low slopes and coast-lands set with groves of coco-nut palms, bread-fruit trees, and screw pines. The flora is extensive, and about half the species are peculiar to the islands. Amongst characteristic trees are the *koa*, the candle-nut tree, and the *ohia* (mountain or wild apple); the latter forms, especially in Maui, large natural orchards, yielding refreshing fruit. There are no indigenous mammals larger than the rat, unless, indeed, the dog and pig may be so considered, no snakes, and few insects; birds are better represented, and fish abound. Horses, cattle, sheep, and other domestic animals have been introduced, and are now numerous.

Climate.—The climate is remarkably moderate; owing partly to the influence of the oceanic currents the temperature is about 10° lower than that of other countries in the same latitude. The mean temperature ranges between 52° in winter and 91° in summer, the mean for the year being about 74° F. Only two seasons are recognised, and the greatest rainfall takes place in winter. In the higher parts the air is bracing. The climate is, on the whole, healthy. Leprosy is, however, endemic.

People, History and Government.—The people are fair for Polynesians, well built, good-tempered, and fairly industrious. The race, however, appears to be slowly dying out here as in the other Pacific islands. Captain Cook visited Hawaii (which he described by the name of Owhyhee) in 1778, but there is evidence that the islands were previously known to the Spaniards. On Cook's return to the islands in 1779 he was murdered by the natives on account of a misunderstanding. During the latter part of the eighteenth century, Kamehameha I. brought all the islands under his personal sway. The familiar Polynesian system of *Tabu*, by which persons, places, or things were interdicted or declared sacred, was the great lever for the exercise of authority. The son and successor of the founder of the monarchy broke the Tabu, disavowed the old idols, and encouraged the American missionaries who settled in the islands in 1820. In 1840 a constitutional government was established under Kamehameha III. and recognised by European Powers. In 1893 a dispute occurred between Queen Liliuokalani and her ministers which led to the establishment of a republic; and in 1898 the islands were annexed by the United States as a territory. A telegraph cable unites the islands with America.

The position of Hawaii "at the cross-roads of the North Pacific" on the line of vessels trading between the ports of western North America, on the one side, and those of Japan, China and Australia on the other, has greatly promoted its commercial development. Regular lines of steamers touch at Honolulu from San Francisco, Vancouver, Yokohama, Hongkong, Sydney and Auckland. Good roads have been constructed, and more than 100 miles of railway. The soil is in great part fertile, and

almost all tropical and subtropical products flourish. Agriculture is the principal industry. Sugar is the staple product, and accounts for all but a small proportion of the exports. Coffee, rice, hides and bananas are next in importance. The chief imports are provisions and manufactured goods, and practically the whole of the trade is with the United States.

Honolulu, the capital, is situated on the south coast of Oahu Island, and contains an extraordinarily cosmopolitan population. It has several handsome public buildings. South-west of the town is the picturesque promontory of Diamond Head, and at its base Kapiolani Park.

Islands.—Hawaii, the largest and most southerly of the group, is occupied in the central part by a plateau from which rise the extinct volcano of Mauna Kea (13,800 feet), the active crater of Mauna Loa (13,650 feet), from the rim of which fields of bare lava slope outwards and downwards for about 4,000 feet, and Hualalai (8,300 feet), which was last active in 1811. The chief crater is, however, not at the summit, but at Kilauea, about eighteen miles distant on the eastern slope, at an altitude of about 4,000 feet. This is about nine miles in circumference, the depth varying from 700 to 1,100 feet, with the rise and fall of the molten mass. The greater part of the surface is covered with lava solidified in rugged masses, but openings occur in the crust in which the intensely heated liquid lava rises and falls, sometimes thrown high up into the air, where it is caught by the wind and drawn out into long threads, like spun glass, called by the natives "Pele's hair," from one of their old goddesses. The island contains many interesting buildings connected with the ancient worship and the former kings.

Maui is an island formed of two lofty peninsulas connected by a low isthmus. In East Maui is the extinct volcano of Mauna Haleakla, "Temple," or "House of the Sun," about 10,000 feet high, with the largest crater in the world, about twenty miles in circumference. Molokai is a small mountainous island; on its northern coast the leper asylum of Hawaii is situated. Oahu, on which the capital stands, is picturesque with the fertile plain of Ewa in the centre. Kauai, sometimes called the garden island, is the most northerly of the main group, and in parts well adapted for agriculture.

STATISTICS OF HAWAII.

	1884.	1896.	1900.
Area of Hawaii (square miles)	6,640	6,640	6,640
Population of Hawaii	80,578	109,020	154,001
Density of Population, per square mile	12	16	24
Population of Honolulu	20,487	29,920	39,305

Population (1900): Hawaiians, 29,834; Japanese, 58,500; Chinese, 25,742; White, 28,533.

ANNUAL TRADE OF HAWAII (*in pounds sterling*).

	1891–95.
Imports	1,156,500
Exports	1,852,400

THE PRINCIPAL ISLAND GROUPS OF THE PACIFIC.

	Area (square miles).	Approximate Population.	Protectorate.
I.—MELANESIAN CHAIN:			
New Caledonia and Loyalty Islands	7,630	60,000	French
New Hebrides	5,300	75,000	Brit. & Fr.
Santa Cruz	360	5,000	Native
Solomon Islands	12,000	70,000	British
Bougainville Island	5,000	20,000	German
II.—MICRONESIAN CHAIN:			
Fiji	7,754	118,000	British
Tonga Islands	374	19,250	„
Samoa	1,700	39,000	Ger. & U.S.
Ellice Group	14	2,400	British
Gilbert Group..	166	35,200	„
Marshall Islands	158	15,000	German
Caroline Islands	370	40,000	„
Pelew Islands..	190	3,000	„
Marianne Islands	420	10,200	„
III.—SOUTH TROPICAL CHAIN:			
Cook Islands	142	8,400	British
Tubuai Islands	110	880	French
Society Islands	630	16,300	„
Low Archipelago and Gambier ..	390	5,470	„
IV.—SCATTERED GROUPS:			
Marquesas Group	480	4,450	„
Pitcairn Island	2	130	British
Easter Island..	55	150	Chilean
Juan Fernandez Group	150	—	„
Phœnix Islands	16	60	British
Manihiki Group	12	1,000	„
Tokelau	12	520	„
Galapagos	2,950	200	Ecuadorian
V.—NORTH TROPICAL CHAIN:			
Hawaii	6,700	154,000	United States

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BOOK IV.: NORTH AMERICA

CHAPTER XXXVII.—THE CONTINENT OF NORTH AMERICA.

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Resemblances between North and South America.—The number of continents interrupting the great ocean is so small that it is difficult to determine what are essential and what are unessential continental features. The overgrown land area of Eurasia and the small continent of Australia are so unlike in structure and form that no just comparison can be drawn between them without straining the slight resemblance of parts that are imagined to correspond with one another. If all the continents were as much alike as North and South America, the problem would be much simpler. Here distinct resemblances with an assured basis in geological history may be discovered; and perhaps for this reason the repeated features of these two land masses are often taken as the essential features of continental form.

In a very general way, the two Americas each have a greater belt of mountainous highlands along their western side; and two lesser highlands on the north-east and south-east. The greater highlands include many volcanic cones and lava sheets, and intermont basins; and the drainage of the latter frequently fails to reach the sea. Eruptive and mountain-making disturbances have here been in operation in relatively recent geological periods. The lesser highlands owe their deformed structures to ancient disturbances, although their present altitude above sea-level may have been gained by uplift at a comparatively modern date in the Earth's history. North-east of each of the north-eastern highlands lies an archipelago; but the islands of the two archipelagoes are very unlike in size and origin. Between the western and eastern highlands lies an extensive belt of plains at a moderate altitude above the sea-level, and with ill-defined divides between the chief river systems. The Mackenzie and Orinoco flow northward, the St. Lawrence and Amazon flow eastward, and the Mississippi and La Plata flow southward.

Contrasts between North and South America.—Although differing in a host of minor details, these large resemblances serve to establish true continental homologies; but their value would be lost if the comparison were pressed too far. The most important points of con-

trast result from the situation of North America chiefly in the north temperate zone, while South America has its greatest width in the torrid zone. The Arctic archipelago includes one of the two great glacial sheets now existing; and its shores are bound by the ice foot every winter. The West Indies rise through warm ocean currents into the warm trade winds; their largest island bears elevated coral reefs, and living coral reefs border many of their shores. The freezing waters of Baffin and Hudson bays and the cold Labrador current that they give forth have no likeness in the "caldrons" of the Carribean Sea and the Gulf of Mexico, or in the warm current that flows from them. Under the severe climate of the far north the lichens and mosses of the "barren lands" west of Hudson Bay, and the coniferous forests of the inhospitable uplands of Labrador have little likeness to the grassy llanos of the Orinoco and luxuriant tropical forests of Guiana. The direct and indirect results of glaciation, so pronounced in North America, include features so important as the Great Lakes of the St. Lawrence system, for which the Amazon, under the equatorial rain belt, has no parallel. Tropical North America, with mangroves and coral reefs along its shores, malaria on its coastal lowlands, and an agreeable climate on its plateaux, forms a striking contrast to the narrowing southern extremity of South America, whose inclement climate illustrates the real character of the misnamed "south temperate zone."

Resemblances between North America and Eurasia.—A comparison may be drawn between North America and Eurasia in which climatic as well as structural and topographical features have certain striking resemblances; but here the repetition is like that of the two hands, Eurasia being on the right and North America on the left of the axis of symmetry. The correspondence extends to so many structural features that it has been an embarrassment to the science of geology, by giving some basis for the belief that all the world was made on the pattern which north-eastern North America so largely duplicates from Europe. The Laurentian highlands correspond to Scandinavia and Finland; composed of very ancient and greatly denuded rocks, highest and deeply fjorded on the Atlantic side, decreasing in altitude inland, and lately (as the Earth views time) depressed and submerged in Hudson Bay and the Gulf of Bothnia. Newfoundland and the Maritime Provinces, with the adjacent shallow ocean waters on the fishing grounds of the Banks, may be paired with Great Britain and Ireland, and the shallow waters of the continental shelf there adjoining. The St. Lawrence system, from its broad gulf to the great lakes is represented by a more submerged belt from the North Sea through the Baltic to the Gulf of Finland; while the extensive lakes further north in Canada are represented by the larger lakes of northwestern Russia. The Appalachians, with their basins of deformed coal measures stretching from Nova Scotia to Alabama, may be likened to an ancient coal-bearing mountain system of similar date, which extends from Wales across Belgium and far eastward into Germany. From the

Laurentian and Scandinavian highlands, extensive ice sheets have spread over the adjacent lands in geologically recent times; advancing chiefly south and south-westward in North America, and south and south-eastward in Europe; leaving the land dotted with lakes, and creating new landscapes in the heavy drift deposits left on the peripheral areas (Figs. 52 and 329). The fertile prairies of the Ohio and upper Mississippi basin and further north to Winnipeg, underlain by widespread Palæozoic formations, correspond to the Russian plains of horizontal Palæozoic strata. The treeless plains formed largely by Cretaceous and Tertiary sediments, slowly ascending towards the base of the Rocky Mountains, match the Asiatic steppes of Tertiary deposits, slowly ascending towards the great mountain chains of central Asia. In both these regions of great horizontal extent and small vertical relief, the rainfall decreases with distance from the Atlantic, and the innermost districts are sub-arid or desert. Not until the massive mountain chains of central Asia are reached can we find the homologue of the western mountainous highlands of North America.

East Coast.—The coast lines of North America offer many illustrations of the manner in which relatively slight movements of elevation or depression of a continental mass cause important changes in its boundary, and introduce peculiar controls over the occupations of its inhabitants. From New England north and west nearly to the mouth of the Mackenzie river, the land now stands somewhat lower than its average position during a considerable part of Tertiary time; hence the coast is generally bold and rocky, many deep bays indent the land, outlying islands stand off shore, and the submerged lowlands broaden the continental shelf. The Gulf of Maine with its branch into the Bay of Fundy, the Gulf of St. Lawrence heading in a great estuary that leads tide water seven hundred miles inland, Hudson Bay and the many channels between the Arctic islands must all be regarded as occupying "drowned lowlands." It is true that in geologically recent times a movement of uplift has carried wave-cut cliffs, wave-built beaches, and bay-floor sediments above the present sea-level around a great part of this continental border, thus partly restoring to the lands what they had previously lost; but as the shore line is still fringed with bays, inlets, and fjords, the uplift cannot have been so great as the depression that preceded it. The outlying area of Greenland is a great plateau of ice and snow, burying a rugged land, whose shore line is fjorded like that of its neighbours.

From New York city southward, the dominating continental movement of recent times has been upward; for the coastal plain of the Atlantic States and of the Gulf of Mexico (see Figs. 353 and 360), demonstrates elevation as clearly as the bays and fjords further north demonstrate depression. Here the coast is low and flat, fringed with sand reefs built by wave action on the shallow sea bottom. The elevation is complicated with recent depressions of slight amount, by which certain open valleys

along the coast from New Jersey to North Carolina have been transformed into shallow arms of the sea; but this depression is evidently of less extent than the general uplift that preceded it, for the arms of the sea seldom reach to the inner border of the coastal plain. In spite of the depression, the continent retains some of the breadth gained by elevation, a welcome addition to the land surface in a latitude of mild climate, fully compensating for the submergence of certain lowlands further north, where the sea water is probably as valuable in providing fishing grounds and harbours as the lost lowlands would be for farming under the colder air of those higher latitudes.

West Indies.—Although the West Indies were in an earlier paragraph associated with South America, they may here be briefly described with the northern continent. They offer three distinct types of land forms. The larger islands, trending east and west, are the crest of great ridges that divide the adjoining seas into well separated compartments, and these ridges are best regarded as the submarine beginnings of an Antillean mountain system. Many of the Lesser Antilles, arranged in a curved line that recalls the island loops bordering eastern Asia, are of volcanic origin. The Bahamas are low islands of organic growth, formed in large part of wind-blown coral sand, of flat surface, and now partly submerged by recent depression. They have steep submarine slopes to the north-east, where the land rapidly descends to great depths beneath the Atlantic.

West Coast.—The western coast of North America repeats certain features of the eastern coast, but with diminished breadth. North of latitude 48°, there is the ragged outline that results from recent submergence; but the measure of submergence appears to lessen along the western side of Alaska, where the great delta of the Yukon would imply that the land has been more stable than further south-east. The Aleutian Island chain, chiefly volcanic, is the first of the series of loops fringing the eastern border of Asia. For this reason, as well as for certain other features of resemblance, the frozen lowlands of north-west Alaska may be rather closely associated with those of north-eastern Asia, the two being separated only by the narrow and shallow waters of Bering Strait. Along the coast of southern Alaska and British Columbia, submergence has led the sea far into the valleys of the mountainous highlands. Some of the inner longitudinal valleys, beyond the outer ranges, are now under water, forming "canals" of great value for coastwise navigation; the enclosing range stands forth in a chain of hilly and mountainous islands. The land hereabout commonly plunges at so steep an angle into the sea that level ground is wanting along the shore, except where rivers have built their deltas forward in protected bay heads.

Further south, the western coast of the United States and of Mexico exhibits signs of comparatively recent elevation, of increasing distinctness southward. Elevated beaches are described in Washington and California. Strips of coastal plains occur along the Mexican coast, but they nowhere

attain the breadth of those bordering the Atlantic, and moreover, disorderly movements have disturbed many of the littoral structures of California in comparatively recent times; these movements being associated with the modern periods of growth of the western mountain system, and having no analogy along the Atlantic coast. Notable among illustrations of these littoral disturbances are the islands that lie off the coast of southern California, separated by deep-water channels from the mainland, and having the appearance of disordered and dissected blocks of the Earth's crust, here rising above the level of the sea. Appropriate to a region of recent disturbance, the continental shelf is of very moderate development, averaging not more than ten miles in breadth along the coast of California. It is trenched at numerous points by "submerged valleys," which are taken to indicate that for a relatively brief period the continental border stood higher than at present, but the submergence by which the present relative attitude of land and sea were gained did not suffice to produce a coast of very irregular outline, and this downward movement may be regarded as only an episode in a more general movement of irregular elevation.

On the coast thus fashioned, the attack of the sea has cut cliffs on the headlands, and has formed concave shores of sweeping curvature in the re-entrants; well protected harbours are therefore relatively rare. The chief re-entrant of the southern coast is the Gulf of California; this seems to be a trough of local depression, while the enclosing peninsula of Lower California is a mountain range of local and irregular elevation. The Valley of California between the Sierra Nevada and the Coast Range is another trough of local depression; but here the trough is filled with land waste washed from the adjoining mountains, and forming a fluviatile plain. The sea enters a short distance inland from San Francisco, here making the only strong re-entrant for a long distance along the Pacific border; it has naturally become the site of the metropolis of western North America.

Laurentian Highlands.—The chief subdivisions of North America may now be reviewed in a general way. The Laurentian Highlands, with outliers in the Adirondack Mountains of New York and in the rugged uplands of northern Wisconsin and north-eastern Minnesota, consist of very ancient rocks. Their coarsely crystalline texture shows that the rocks now visible once lay far under ground; for only deep within the crust can such rock texture be produced. Their greatly deformed structure indicates that the rock masses which formerly rose above the present surface once possessed a vigorous mountain form; for mountains are the only form appropriate to such structures at the period of their deformation. The comparatively even surface of the highlands of to-day must therefore be regarded as the denuded platform of an ancient mountain system; for only by great denudation can the former mountain cover of the existing textures and structures have been removed. But all this must have happened in the dawn of geological time, for the ancient mountains were worn low early

enough for some of the oldest fossiliferous strata to be laid upon their flanks when their borders were submerged beneath an ancient sea. The Laurentian Highlands may therefore be viewed as part of a very ancient land; one of the earliest and most extensive lands of the globe.

Since the time when all this happened the geological history of the region has been uneventful. It has probably suffered repeated movements of elevation and depression, with corresponding alternations of denudation and deposition; but as all the flanking Palæozoic strata are still essentially horizontal, no disorderly crushing and no great uplifts and dislocations can have taken place since their deposition. During certain periods of moderate elevation, valleys were eroded in the borders of the highlands; and these, now partly drowned, determine the bays and fjords of the coast.

Glacial Action.—Most notable of all events since the great denudation of early time is the glaciation of the Laurentian region in a very modern stage of the Earth's history; a time when these highlands resembled the Greenland of to-day. The ice sheets crept far south and west overland, and the results of their invasions on the bordering regions are of great geographical importance. The highlands themselves, scoured under the ice sheets, present a succession of rocky mounds and irregular hollows, drained by disorderly and undeveloped streams. Here we find ragged lakes, often having more than one outlet; forested swamps and grassy marshes traversed by sluggish streams; split rivers including large "islands" tens of miles in length, between the divided channels; stretches of smooth streams in open valleys alternating with falls and rapids in rocky gorges. This great region, barren in the north-west, forested in the south-east, is an irredeemable wilderness.

FIG. 329.—*The Glaciation of North America.*

A short distance outside the highland border, where the Palæozoic strata lie upon the floor of the older rocks, broad plains alternate with large lakes that occupy depressions in the weaker layers; ten or more important water bodies lie in a curve from Lake Ontario to Great Bear Lake. The history of these lakes has gained an almost dramatic interest in recent years, for it has been shown that they are the residuals of much greater lakes that for a time occupied the lacustrine belt when the present outlets were closed by the retreating ice sheet of the last glacial invasion. The expanded waters of the glacial-marginal lakes carried silt from the melting ice, and

the lake floors now laid bare form smooth prairies of fine deep soil, yielding great crops of wheat if not too far north. Their fertility coupled with modern means of transportation have seriously affected the commerce in the food supply of the world. The lakes still remaining afford a marvellous system of inland waterways.

South and west of the lake belt, glacial action has been on the whole constructive, instead of destructive. For tens of miles together, not a ledge of rock is to be seen ; the surface is heavily sheeted with glacial drift, the greater part of which has a fine and fertile soil. Although commonly treated as if pertinent to geology, it cannot be questioned by those who know the appearance of this vast drift-covered prairie region that glacial action has many geographical consequences.

Appalachians.—The Appalachian highland, extending from Newfoundland to Alabama (and probably reappearing west of the Mississippi in Arkansas and Indian Territory) is one of those old mountain ranges, made in the earlier and middle ages of the Earth's history ; so long ago that the original mountains have been for the most part worn down to lowlands ; their present moderate height is due to the local success of the most enduring rocks in resisting complete denudation, or to a relatively modern uplift of the region to upland height ; or to both causes combined. Being so old, the Appalachians have none of the bold and irregular forms of younger and more vigorous mountains, where lofty peaks rise between deep passes. Ridges with even crest lines and broad uplands separated by open and populous valleys are the prevailing forms. Only the culminating parts of the system, the White Mountains of New Hampshire and the Black Mountains of North Carolina, retain distinctly conical or peak-like forms, and even here, forests clothe most of the mountain slopes, only occasional summits rise above the tree line, and bare, angular crags are seldom seen. The middle part of the system, known as the Allegheny Mountains in Pennsylvania and Virginia, is of moderate elevation, and is intersected by many and broad valleys. Immigration into the Ohio valley was here less obstructed by the mountain ridges than by the Allegheny plateau which lies west of them.

FIG. 330.—*Configuration of North America.*

Trends in a north-east and south-west direction predominate in the Appalachians, as may be seen in the land arms and fjords of Newfound-

land and Nova Scotia, as well as in the ridges and the valleys of the Alleghenies in Pennsylvania and Virginia. The boundaries of the system are of interest in connection with its physical history. From New York to Newfoundland the Appalachian belt of New England and the Provinces dips under the sea on the east and north-east; its structures do not end, they simply descend beneath the sea and are lost to sight on account of a recent continental depression. As the uplands slant down to lowlands near the coast they are occupied by a large population, especially in the harbour cities where manufacturing and commerce are active. Further inland the population is almost limited to the open valleys. From New York to Alabama, the Appalachian structures decrease in height to the south-east and south, and disappear under the coastal plain of the Atlantic and Gulf States; the inner margin of the plain roughly marks the shore line of an earlier period of continental depression. Here a rural population occupies the broader valleys and the lower uplands; the chief cities being associated with the inner border of the coastal plain, where rapids in the outflowing rivers afford water power; and again with the outer border of the plain where the bays and the estuaries give harbourage to seagoing vessels. Only on the north-west is a true termination of the mountain system discovered. Here the deformations that give so distinct a trend to the upland ridges and valleys of the Appalachians die out. The Laurentian uplands and the Adirondacks, consisting of ancient rocks long undisturbed, adjoin the Appalachians of the Provinces and of New England; the Allegheny plateau, of nearly horizontal sedimentary strata, adjoins the Appalachians of the middle and southern States.

The Allegheny plateau is known as the Catskill Mountains in New York, and the Cumberland tableland in Tennessee and Alabama. Between these two extremes much of its hilly surface is known as the Allegheny Mountains, although this term should properly be restricted to the long, even-crested ridges that lie next to the south-east from Pennsylvania to Tennessee. Taking the plateau altogether, it descends by a strong escarpment into the valleys of the Alleghenies on the south-east, while it gradually decreases in altitude towards the prairies of the middle Ohio and Mississippi on the west. Throughout this plateau, as well as among the Pennsylvania ridges on the east and under certain of the prairies further west, lie the great stores of coal on which the industrial prosperity of the eastern United States largely depends.

Rocky Mountain System.—The western highlands of North America, or the Rocky Mountain system in general, is widest in latitude 40°; and thence narrows to its end in the Alaskan range about latitude 63°, and to its termination near the great Mexican volcanoes in latitude 18°. Its eastern boundary is generally well defined by a sudden descent to the Great Plains. Its western border touches the sea for nearly all its length. Within its area there is a great variety of structure and form. The Selkirk Range, crossed by the Canadian Pacific Railway, and the broad St. Elias Alps in

Alaska, are truly Alpine in form, with great snow-fields and long glaciers. The Cascade Range in Washington and Oregon and the southern ranges of Mexico are crowned with great volcanic cones. Extensive plateaux of horizontal structure are found in Arizona, Utah and New Mexico, bearing dissected volcanic cones and lava flows on the uplands, and trenched by deep canyons, of which that of the Colorado is the most famous. Vast lava plateaux occupy intermont basins in Idaho and Washington, where they are cut down in the canyons of the Columbia and Snake rivers; that of the Snake being less known but hardly less marvellous than that of the Colorado. Many ranges of moderate dimensions inclose intermont depressions that are now occupied by aggraded or waste-filled plains; the plateau of Mexico being only an extensive development of these basins between the eastern and western ranges of the Sierra Madre.

As is the rule among mountains, the individual ridges generally result from the erosion of valleys in broadly uplifted ranges, rather than from direct and local uplift. Many of the separate ridges of the Rocky Mountain ranges in Canada and Montana are thus produced; the view from their summits disclosing a "sea of mountains," ridge following ridge to the horizon, like waves on the ocean. The peaks frequently attain, but seldom exceed, a height of 12,000 or 14,000 feet. Greater elevations are found in the far north-west where Mounts St. Elias and Logan exceed 18,000 feet on either side of the Alaskan boundary, and in the far south, where the Mexican volcanoes rise above the snow line to similar but slightly less altitudes.

In certain parts of the western highlands, dislocation is more directly responsible for the existing relief of the land; and this as well as the great general altitude of the region places it in strong contrast with the lesser eastern highlands. Certain of the mountain ridges and ranges are the immediate result of the uplift of the crust-blocks whose initial form has not yet been wholly effaced by the carving of valleys on their flanks. The Sierra Nevada is, in a large way, a great tilted block, or series of blocks, the eastern face being short and steep, the western slope being long and relatively gentle; both faces are now scored by deep valleys through which the mountain waste is carried out to form the adjacent plains. The lofty plateaux of Arizona are bounded by great cliffs, the edges of the huge plateau-blocks, that have been uplifted to altitudes differing by a thousand feet or more, and now made rugged by gnawing streams. Further east, basins among the mountains of Colorado, Wyoming and Montana, are the obverse of the ranges that have been uplifted around them, the basins being heavily aggraded with the mountain waste. It is believed that lakes occupied some of these basins for a time, but that stage is now past; the outflowing rivers have cut down the enclosing ranges in deep gorges, still so narrow as to be impassable except to carefully constructed railroads. It is in the basins that most of the population gathers in the mountain region.

South of latitude 18°, the mountains of Central America are largely volcanic, with little relation to the features of the Rocky Mountain system. Where ridges appear, they generally have east and west trends, and thus seem to be associated with the Antillean Mountain system, of which the greater part is submerged in the Caribbean Sea and made known only by soundings as submarine ridges.

The Great Plains.—The Great Plains slope eastward from the base of the Rocky Mountains. They are broadest between latitudes 35° and 55°. Further north, they are narrowed by the convergence of the lacustrine belt on the east and the mountains on the west; further south, they merge into the coastal plain of the Gulf of Mexico; beyond southern Texas their width is measured only in tens of miles. Over their widest expanse they present a vast surface of moderate yet varied relief. They are frequently interrupted by embossed mesas and escarpments, or by incised valleys; yet the name of "plains" is well applied, for the view from every little eminence is almost as boundless as upon the sea. On the east, the plains merge into the prairies; on the west they are interrupted by foot-hills and outlying ridges near the base of the mountains. A mountain group in Dakota known as the Black Hills, named from the dark forests that crown it, diversifies the treeless plains and introduces mining and lumbering in the midst of open cattle ranges. The Ouachita ridges extending westward from Arkansas, break in upon the plains about latitude 35°; further south they are known in Texas as the "Llano estacado" with bold and ragged escarpments on nearly all sides.

Like the vast plains of eastern Europe and western Asia, the Great Plains of North America stretch over so great a distance on the Earth's convex surface that they are more varied in climate than in form. Far north, they are frozen and barren. Between latitudes 50° and 60°, they are forested, the temperature here not being low enough to prevent tree growth and not high enough to cause active evaporation and leave the surface arid. From 55° southward into Mexico, the plains are treeless for the most part, this being a direct result of their dryness, which in turn is due almost as largely to their summer warmth as to their light rainfall. In Mexico and Yucatan, where the rainfall increases under the trade winds, the lowlands have a tropical flora of increasing richness southward; in contrast to the mild climate of the plateaux, the narrow coastal plains are here known as the "tierra caliente."

Climate.—The varied climates of North America afford many combinations of the geometrical zones of temperature, wind, and rainfall, appropriate to the globular form of the Earth, with the irregular or arbitrary arrangement of these climatic factors caused by the non-geometrical outline and relief of the lands.

Zonal arrangement is seen in the decrease of temperature and rainfall from almost equatorial conditions at the Isthmus of Panama, to almost polar conditions bordering the Arctic Sea. It is displayed with equal distinctness

in the easterly winds of the torrid belt that cover the peninsular and insular lands on the south, and in the stormy westerly winds that prevail over a broad belt of middle and higher latitudes. The irregular distribution of the climatic factors is seen in the far northward summer migration of the heat equator to the deserts of Arizona and western Mexico as compared with the moderate migration on the oceans, and in the great annual temperature range with extreme winter cold on the central plains of Canada, in contrast to the moderate ranges prevailing over the oceans in similar latitudes. It is found again in the plentiful rainfall of the western mountain slopes in temperate latitudes, while the intermont basins and the eastern slopes are dry, and in the abundant rainfall of the eastern slopes in the trade wind belt, where the western slopes are relatively arid. Nothing can be more striking than the contrast between the moderate change of seasons along the Pacific coast from Alaska to California, and the violent changes from winter to summer in the interior and along the middle Atlantic border. These unlike conditions are dependent partly on the arrangement of ocean currents as guided by continental barriers, and partly on the distribution of temperatures by the prevailing winds. The British Islands have, under the benign influence of the North Atlantic drift, the most abnormally mild climate for their latitude in the world ; Labrador in the same latitude has one of the most severe of climates. It is a frozen and snow-covered wilderness in winter ; it might have a comparatively high mean temperature in summer, but for the chill that is received when the wind blows inland from the cold ice-laden current along its coast.

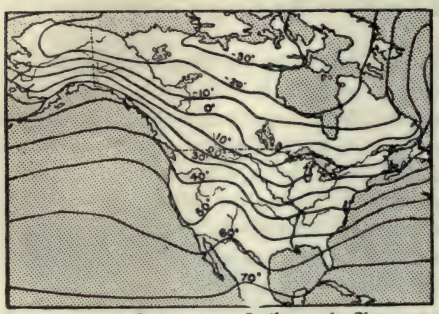

FIG. 331.—*North America. Isotherms for January.* (*After Buchan.*)

FIG. 332.—*North America. Isotherms for July.* (*After Buchan.*)

Following upon these great interior changes of temperature, the prevailing winds exhibit something of a monsoon effect in certain regions. They frequently blow from the Gulf of Mexico up the Mississippi valley in summer, and down the valley to the Gulf in winter. Some indications of inflow and outflow may also be perceived in summer

and winter along the Arctic coast. There is furthermore a breaking of the wind belts merely from the occurrence of transverse land barriers. It is chiefly on account of the obstacle formed by the western highlands that a branch of the prevailing westerly winds turns towards the trades off the Pacific coast, especially in winter when the low continental temperature discourages the entrance of winds from the ocean. Similarly, the trades give forth branches to the westerly winds east of the Mexican highlands, especially in summer when the high continental temperature persuades the winds to blow inland.

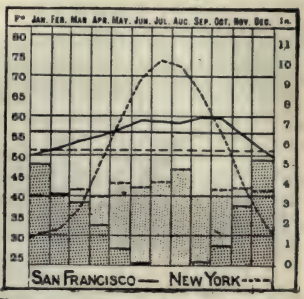

FIG. 333.—*Temperature and Rainfall Curves for San Francisco and New York.*

The ovals of high and low pressure, known as cyclonic and anticyclonic areas, which so markedly characterise the westerly winds of temperate latitudes, are not only well developed as they drift across North America, but they have been abundantly charted in the great series of official weather maps for the United States and a bordering belt of Canada. While the anticyclones are generally associated with fair weather, the cyclonic areas provide most of the heavy clouds and rainfall on their path. During the passage of these atmospheric disturbances across the interior plains, they determine the strong changes of weather for which the region is noted; the vast extent of comparatively low open country permitting a free importation of air currents from frigid and torrid latitudes on either hand.

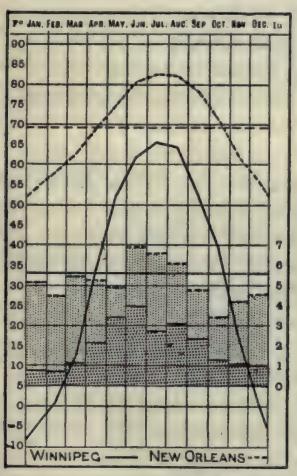

FIG 334.—*Temperature and Rainfall Curves for Winnipeg and New Orleans.*

Rainfall and Vegetation.—While the extremes of temperature are the controlling climatic factors in determining the vegetable products and human industries between the far north and south, variation of rainfall exercises the most important climatic control across the great breadth of the continent in middle latitudes. A vast extent of country in the interior, shut off by the mountains from the moist winds of the Pacific, is too dry for ordinary processes of agriculture, unless resort is had to irrigation. Where most arid, the surface is a desert, although seldom so absolutely barren as the driest deserts of the Old World. Where a light rainfall is received, a thin growth of grass that once supported vast herds of bisons now gives scanty pasture to ranging cattle. Trees are wanting

over a great space of broad plains and intermont basins west of the 100th meridian; but the mountain slopes are forested, especially as the Pacific is neared, the western descent of the Cascade Range being densely occupied by trees of great size. East of the 90th meridian, excepting for the prairies of the Mississippi and Winnipeg region, and the barren grounds of the far north, forests originally covered the entire country, for here the beneficent submergence under the Caribbean and Mexican Mediterraneans of what would otherwise be an American Sahara permits a plentiful rainfall over the eastern part of the continent. When first explored, great tracts of forest were found to have been devastated by fire. Although the forests have now been extensively cut for timber and cleared for farming, the living trees at present are believed to be not greatly decreased below the number that were growing at the time of first settlement.

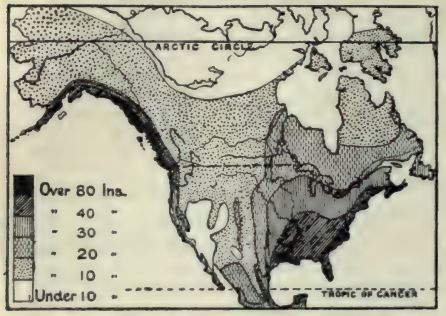

FIG. 335.—*The Mean Annual Rainfall of North America. (After Supan.)*

Aboriginal People.—Four hundred years ago, North America was for the most part thinly populated by savage or barbarous peoples. In Mexico and Central America the inhabitants had developed an elaborate stone architecture, shown now in the temples whose ruins are often concealed under heavy forest growth. Further north, numerous earthworks and fortifications mark the sites of pre-Columbian settlements, as in the Ohio basin; these are by some attributed to an extinct people; by others, to the immediate ancestors of the wandering warlike tribes, to whom a memorial of Columbus's faulty reckoning of longitude still clings in the name of "Indians." The early Americans had learned to do simple weaving, to make rough pottery, to carve shells, to hammer the native copper of Lake Superior, and to chip flints and polish stone imple ments in the neolithic fashion. They seem to have had no horses when first discovered, but the tribes of the open prairies and plains became expert horsemen in later times. In the western desert interior there are "pueblos," or villages, built for protection on isolated mesas, still occupied, and probably to be associated with the abandoned cliff dwellings of the neighbouring canyon walls. On the north-west coast there are tribes remarkable for their fantastic wood carvings. In the far north the Eskimos are made torpid, as far as development goes, by the extreme rigour of their surroundings. Striking differences of language prevailed among many of the tribes, especially those on the Pacific slope.

History.—The early discovery of North America by the way of

Iceland seems to be authenticated in the "Sagas," but no traces of previous settlements were found by later comers. The Columbian discovery sooner or later led the Spaniards to found colonies from Florida southward, the French from Louisiana and Acadia (now Nova Scotia) northward, and the British along the middle Atlantic coast. Conquest, treaty and purchase have now placed the Anglo-Saxon element in possession of the continent from Mexico northward. The defeat of the French at Quebec in 1759 brought to the British crown all the St. Lawrence region except some small "enclaves" on or near Newfoundland. The last quarter of the eighteenth century witnessed the stormy separation of the Atlantic colonies from the United Kingdom, and their union in the first of the great modern republics —the United States. Purchase in 1803, when the Emperor Napoleon was in need of money, brought Louisiana (the western basin of the Mississippi) to the United States, and in 1867 added the previously Russian territory of Alaska to the Republic. Mexico and the other Central American States secured their independence from Spain in the first quarter of the nineteenth century, and adopted republican forms of government (Fig. 350). The attempt to bring Mexico again under European control, at a time when the United States was distracted by civil war, fortunately met early failure. In the meantime, fed by a great number of European colonists, the several northern British colonies (except Newfoundland) have united in the Dominion of Canada, which now stretches from the Atlantic and Pacific to the Arctic; the territory of the United States has been extended west to the Pacific, partly by exploration, partly at the expense of Mexico; and, as a result of the war of 1898, Cuba has been separated from Spain, and Porto Rico fallen to the share of the United States as one of the first non-Continental possessions which the future seems to have in store for it.

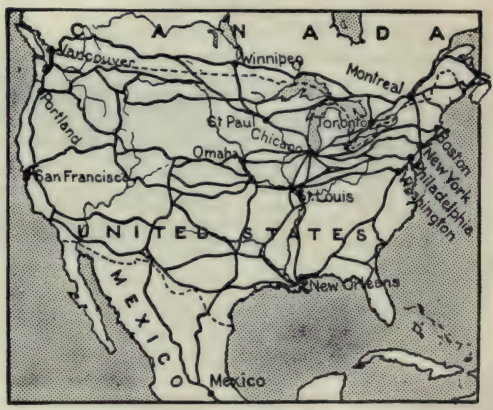

FIG. 336.—*Chief Railways of North America.*

The rapidity with which the northern New World has been turned to the uses of civilisation is an appropriate consequence of the century of steam, electricity, and the wholesale production of steel. Railways and telegraphs now unite the Pacific and Atlantic slopes of North America, and serve as political as well as commercial bonds between the east and west. Steamships and cables bring Europe and North America into the

closest relations as to people and commerce. Even so small a matter as getting the time by one's watch is now done in concert, not with the people of North America alone, but with those of western Europe as well, for the greater part of the northern New World is divided into "time belts," whose noon hour falls four, five, six, seven or eight hours earlier than noon at Greenwich. Isolated villages in the backwoods may still hold to the old-fashioned habit of keeping local time, but the larger communities which use the railways as the basis of nearly all activities, adopt Atlantic, Eastern, Central, Mountain or Pacific time, according to their position.

STATISTICS.

THE COUNTRIES OF NORTH AMERICA.

	Area in square miles.	Population.
United States of America (including Alaska)	3,501,000	75,560,000
Dominion of Canada	3,300,000	5,370,000
Mexico	767,000	13,500,000
Newfoundland (and Labrador)	161,000	217,000

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CHAPTER XXXVIII.—COLONIAL NORTH AMERICA

I.—THE DOMINION OF CANADA

By J. B. Tyrrell, M.A., B.Sc.,
Formerly of the Geological Survey of Canada.

Position and Boundaries.—British North America, including under this name Canada and Newfoundland, occupies the whole of the northern part of the continent of North America, except Alaska, which belongs to the United States. It lies between longitudes 53° and 141° W., and touches the 42nd parallel on the south. The total area is rather over three and a half million square miles, or slightly larger than the United States, including Alaska, and somewhat smaller than the whole of Europe. Its greatest length, on a line drawn from Cape Race, in Newfoundland, to Mount St. Elias, on the boundary of Alaska, is 3,400 miles.

Its only land boundary is with the United States, being separated from the territory of Alaska by the meridian of 141° W., and an undemarcated line parallel to the Pacific coast. The southern frontier, 3,260 miles in length, passes through the straits of Juan de Fuca and Haro on the west, along the parallel of 49° N. to the Lake of the Woods, east of which it takes a very irregular course, passes through the middle of Lakes Superior, Huron, Erie, and Ontario, then follows the highlands north of the State of Maine, and finally turns southward to the mouth of the St. Croix river on the Bay of Fundy.

Coasts.—The eastern continental shore extends from the mouth of the St. Croix river in a very sinuous course northwards to Cape Chidley. The Gulf of St. Lawrence, which is its most conspicuous and important hydrographic feature, is a pear-shaped sea 500 miles long, cut off from the main Atlantic by the islands of Newfoundland and Cape Breton, and receiving on the west the great river St. Lawrence. The islands of Prince Edward and Anticosti lie within it. The northern coast of the mainland extends from Cape Chidley to Demarcation Point, on the border of Alaska, north of which is the immense Arctic archipelago, the islands for the most part being separated by rather shallow water. Hudson Bay, which is a great indentation on this northern coast, is one of the most important physical features of the Dominion of Canada, extending, as it does, southward until it reaches to within 300 miles of the

north shore of Lake Superior. It thus divides the land-mass of Canada into two great parts, the smaller lying east and south-east, and the larger west of its shores. It is an inland sea, 1,300 miles in its greatest length, and 600 miles in maximum breadth, with an average depth in the centre of 60 fathoms. Its water, except in James' Bay, is clear and salt like the Atlantic, with which it is connected by Hudson Strait. The Pacific Coast-line, beginning at the Strait of Juan de Fuca, runs north-westward to the southern extremity of Alaska, a distance of 530 miles. It has an extremely irregular outline, on account of the many fjords and off-lying islands.

Configuration and Geology.—The land-surface of Canada, and

FIG. 337.—*The Geological Structure of Canada.*

in fact of the whole of the North American continent, has been built up around a great **V**-shaped area of Archæan rocks, which extends from the northern and eastern shore of Labrador round the north of the Great Lakes, and thence north-westward to the Arctic Sea. In the centre of this **V** lies Hudson Bay, while around it are the fertile plains of eastern and western Canada. This area, which has been called the Laurentian plateau, has a gently undulating rocky surface, in which the existing streams have nowhere cut deep valleys. In the depressions are some considerable areas of fertile land, but as a rule the region cannot support a large agricultural population. The eastern and western borders of the

continent rise in two main systems of mountain chains, known respectively as the Appalachian and Cordilleran systems, the former dying out in eastern Canada and Newfoundland, while the latter, which forms the backbone of the continent, runs to its highest summits in north-western Yukon, where Mount St. Elias has an altitude of 18,010 feet, and Mount Logan a reputed altitude of 19,500 feet. Between the Laurentian plateau and the Appalachian Mountains lies the fertile plain of the Great Lakes and the St. Lawrence valley, which as yet contains the larger portion of the population of Canada, while between the Laurentian plateau and the Cordilleran chain lie the vast plains and prairies of western Canada. The country has been divided by the late Dr. G. M. Dawson into :—(1) *Eastern lowlands and hills,* almost entirely based on old and hard Palæozoic rocks. (2) *The Laurentian plateau.* (3) *The inland plains,* principally based on the comparatively soft rocks of Mesozoic age, which still lie nearly as flat as when they were originally deposited. (4) *The Cordilleran or western mountain region.*

Hydrography.—The mainland of Canada may be divided into four hydrographic basins.

(1) In the Atlantic basin the principal stream is the St. Lawrence, which rises far in the interior of the continent, and after a course of 2,100 miles, in which it chains the most magnificent series of fresh-water lakes in the world, empties by a wide and deep estuary into the Gulf of St. Lawrence. Its basin has an area of half a million square miles. From Lake Erie, the Niagara river is broken by the Niagara Falls, where the whole drainage of the four upper lakes plunges 167 feet over a rocky ledge.

(2) The drainage basin of Hudson Bay is the largest in the Dominion, and into it converge streams flowing from the east, south, and west. Of these the Saskatchewan-Nelson is the most important for length, drainage-area, and the fertility of the land it drains.

(3) The principal stream in the Arctic drainage-area is the Mackenzie river, whose sources are mainly in the Rocky Mountains. The Finlay and Peace form the longest of the tributaries, though the Athabasca, rising farther south, is usually regarded as the main upper branch of the river. Athabasca, Great Slave and Great Bear Lakes—three of the largest of the many great bodies of water which lie along the edge of the Laurentian plateau—are tributary to the Mackenzie.

(4) The Pacific area is in part drained by rapid streams which flow more or less directly into the ocean, among which the Fraser is the most important ; and in part by the Yukon which rises behind the Coast Range and flows more or less parallel with that range, northward through the Yukon district, and westward through Alaska, 644 miles being in Canada.

Climate.—In so extensive a region the climate necessarily exhibits great diversities, but for the most part it may be said to be continental.

Dr. G. M. Dawson divides the whole country into three climatic areas. (1) The Eastern region characterised by great range of temperature and ample rainfall. This includes all the older provinces of Canada, with Newfoundland, and extends westward nearly to Winnipeg. It is naturally the great forest region. (2) The Inland region, adjoining the last and stretching westward to within a short distance of the Pacific Coast. This is characterised by very great range in temperature and moderate rainfall. It includes the great prairies and open plains, but is also in large part more or less wooded. (3) The Pacific Coast region, which does not include the whole Pacific slope, but only a narrow belt on the seaward side of the western mountain range of the Cordillera. The climate is oceanic, with small range of temperature, and great rainfall and humidity.

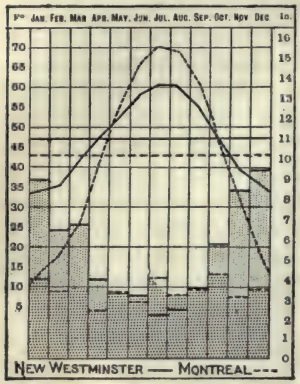

FIG. 338.—*Temperature and Rainfall of New Westminster and Montreal.*

The following table of mean temperature illustrates these climates :—

	Summer. (July, August, September.)	Winter. (January, February, March.)	Range between Mean Summer and Winter.
Eastern.—Charlottetown, P.E.I.	61·9	19·8	42·1
„ St. John, N.B.	58·5	22·3	36·2
„ Halifax, N.S.	61·6	24·7	36·9
„ Montreal, Que.	64·8	17·1	47·7
„ Toronto, Ont.	64·1	24·6	39·5
Inland.—Winnipeg, Man.	59·7	1·5	58·2
Pacific.—Victoria, B.C.	57·0	41·0	16·0

Forests.—Speaking generally, British North America is a region of forest, and east of Winnipeg almost all of the land which is now under cultivation has been cleared of the heavy growth of timber which once covered it. Extending from the Atlantic to the Pacific, and with a width of from 200 to 300 miles, is the vast sub-Arctic forest which is composed largely of black and white spruce (*Abies nigra* and *A. alba*) and larch (*Larix Americana*). These trees have essentially the same northern limit, the black spruce dwindling to a shrub before it disappears, while the others retain throughout their tree-like character. The northern limit of the forest, and the southern edge of the "Barren Lands" is not determined by winter cold, or mean annual temperature, but is controlled entirely by the length and warmth of the summer ; the northern limit of the forest closely follows the line of a mean summer temperature of 50° F.

In eastern Canada this sub-Arctic forest merges on the south into a forest of deciduous trees, characterised by the great number and variety of its species, there being sixty-five species in Ontario alone. In western Canada the trees of the more southern forest continue chiefly coniferous in type,

but on account of the moistness of the climate many attain to gigantic size. In central Canada the coniferous forest is skirted by a belt fifty to a hundred miles wide of intermittent forest of aspen (*Populus tremuloides*), south of which are the open grassy plains, where the climate is too dry for the growth of continuous woods.

Fauna.—One of the most interesting animals to be found on the continent is the musk-ox (*Ovibos moschatus*), which lives, even in winter, on the Barren Lands and on the Arctic islands. Barren-ground caribou (*Rangifer grœnlandicus*) roam in great herds over the same plains in summer, but in winter most of them go south within the edge of the forest. The five remaining species of deer, including the moose (*Alces Americanus*), and the *waskasew*, or American elk (*Cervus Canadensis*) inhabit different parts of the woodland area to the south. Bison (*Bos Americanus*) formerly ranged in countless herds over the plains and prairies east of the Rocky Mountains, but in the wild state they are now practically extinct. Prong-horned antelope are still fairly numerous on the plains, and mountain sheep and mountain goats are to be found in most of the more inaccessible parts of the Cordilleras. The sub-Arctic forest is the home of the most important fur-bearing animals, including the beaver, bear (brown and black), marten, musk rat, otter, fisher, fox (black, red, and white), mink, lynx, skunk, and wolverine. Most of the birds are migratory, breeding during the summer in the north, and going south as the winter sets in. Perhaps the most interesting bird is the Canada jay, or whiskey-jack (*Perisorens Canadensis*), which lives throughout the year in the sub-Arctic forest, and nests and hatches its young in February and March, during the severe cold of the winter season. The coastal waters, rivers and lakes abound in fish, among which the most important are the cod, salmon, herring and whitefish.

People.—When the country was discovered by Europeans, it was occupied by a scattered native population, who were then called Indians. Their descendants are still scattered throughout the whole Dominion, those in the more thickly inhabited districts having adopted the habits and modes of life of the white people in the vicinity, while those in the more remote regions still live by hunting and fishing. The Indians now number about 100,000, or about one-fiftieth of the population.

FIG. 339.—*Average population of a square mile of the Dominion of Canada.*

They are divided into a large number of tribes, which belong to about ten or eleven distinct linguistic stocks. Of these the *Algonkian* is much the largest and most important, for its people occupy the greater part of the sub-Arctic forest from the Atlantic to the Rocky Mountains, and they are, *par excellence*, the fur hunters of Canada. They travel chiefly on the lakes and streams, the birch-bark canoe being their peculiar boat, and the birch-bark tent, or wigwam, their home. The Crees, Ojibways, and Blackfoot

belong to this stock. North of them, to the edge of the Barren Lands between Hudson Bay and the Pacific, are the tribes of the Tinné stock, who are for the most part deer hunters. Further north the Eskimo, or Innuits (Inwī), inhabit the whole northern coast from the Strait of Belle Isle to Alaska, including parts of the shores of Hudson Bay. They are strong and well-built, good hunters, endowed with remarkable perseverance, and capable of enduring great fatigue. They live chiefly on marine animals, which they kill with a spear or harpoon, but there is also an inland tribe on the banks of Kazan river, west of Hudson Bay, which subsist almost entirely on reindeer. The Iroquois were the ablest, both intellectually and physically, of all the North American Indians, and their Confederacy, known as the Six Nations, for a long time held the balance of power between the early English and French settlers. They now live in the settled parts of Ontario and Quebec. The Sioux, or Assiniboines, live on the western interior plains, while the Haida, Kwakioor, Tsimshiian, Salish, and Kootenay live on the coast or in the broken mountainous districts of British Columbia.

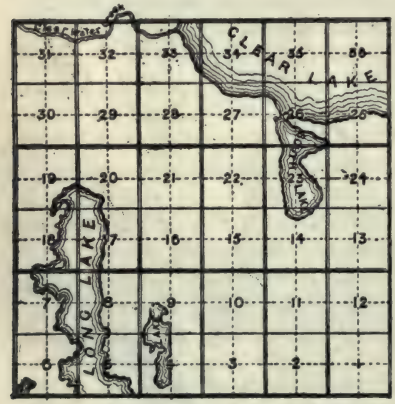

FIG. 340.—*A typical Township Plan of* 36 *square miles showing Sections and Quarter-sections.*

Of the population of Canada in 1891, 86 per cent. were born in Canada, and 10 per cent. in other parts of the British Empire. Of these 29 per cent. speak French, while almost all the rest speak English. Forty-one per cent. are Roman Catholics, while most of the remainder belong to various Protestant denominations.

In the unoccupied parts of the western provinces and territories, land may be obtained either free or at a nominal cost by any one willing to settle upon and work it. This land is held as the property of the Dominion Government until allocated, and the Dominion Land Survey is charged with surveying the unoccupied country and marking it out into rectangular townships, each of six miles square divided by lines running north and south and east and west into thirty-six sections of one square mile each. Thus every piece of land is readily identified.

Internal Communications.—The great rivers and lakes of Canada have furnished means of access from the coast to the interior from the dates of the very earliest settlements. This is especially true of the St. Lawrence, which is navigable to Montreal for ocean-going steamers drawing 27½ feet of water. Thence steamers can ascend to the head of Lake Superior, the obstructions in the rivers being overcome by eight canals and fifty-four locks, which have a depth of fourteen feet or more.

The Saskatchewan and its branches are continuously navigable for steamers of light draft for 1,200 miles; the Mackenzie and its tributaries have 4,300 miles of navigable waters, broken at only three places by rapids or falls. In the Yukon basin there are about 2,600 miles of continuous navigation.

An extensive system of railways now unites the Atlantic to the Pacific Ocean, serving the whole of the settled part of the country and opening up much of the interior to settlement. The total length of these railways in 1902 was 18,714 miles (see Fig. 336), and large schemes of railway extension have been proposed.

Government.—The Dominion of Canada is a federation of self-governing colonies associated for common affairs. The Dominion Government consists of (1) a Governor-General appointed by the British Government to represent the Crown for a term of five years; (2) a Senate of 81 members appointed by the Crown (on the advice of the Privy Council of Canada) for life; (3) a House of Commons of 213 members, elected for five years on a very liberal franchise, liable to be dissolved by the Governor-General on the advice of the Ministry; (4) an Executive Ministry composed of 13 or more members, having seats in the two Houses of Parliament, and holding office only so long as it has the support of the majority of the members of the House of Commons; (5) a Dominion Judiciary composed of six judges, acting as a Court of Appeal from all the provincial courts, though its decisions are subject to review on appeal by the Judicial Committee of the Queen's Privy Council in London.

FIG. 341. — *Armorial Bearings of the Dominion of Canada.*

In each of the provinces there is a Lieutenant-Governor, appointed by the Governor-General in Council for a term of five years; a Legislative Assembly composed of members elected for terms of four or five years; and also in Nova Scotia and Quebec a Legislative Council or upper house appointed by the Lieutenant-Governor in Council for life. There is also an Executive Council of from 5 to 12 members, who hold office as long as they are supported by a majority in the popular Assembly. A Judiciary in each of the provinces is appointed by the Governor-General in Council. Besides these there are in most of the provinces municipal or local councils, who have the control of their local affairs, and have the power to tax for the support of schools and the prosecution of public works of a local character.

NOVA SCOTIA

Position and Coasts.—Nova Scotia, the most south-easterly province of the Dominion of Canada, consists of a long and rather narrow peninsula, extending in a south-west and north-east direction, and the large island of Cape Breton, lying off its north-eastern end. It lies

between 59½° and 66° W. long., and 43½° and 47° N. lat., being thus in the same latitude as Switzerland and the south of France. Near the middle of its north-western side it is connected with New Brunswick by an isthmus which at one point is only 16 miles in width.

The south-western portion of the peninsula has the Bay of Fundy and Chignecto Bay on the south, while the north-eastern end of the peninsula and Cape Breton Island are bounded on the north by Northumberland Strait and the Gulf of St. Lawrence. The Gut of Canso, only a mile and a half in width at its narrowest part, separates Cape Breton Island from the mainland, and the island itself is almost divided by an arm of the sea known as Great Bras d'Or. The Atlantic coast is bold and rocky, and is indented by many bays, almost all of which furnish safe anchorage for the largest ships. On the southern shore of the Bay of Fundy the coast is much less broken, and the northern shore forms a moderately regular coast from Bay Verte round the north point of Cape Breton. Pictou Harbour is the most important of the several good harbours on the north coast.

Along the southern coast of the province, where the waves of the Atlantic Ocean have carved the shore into very irregular shapes, there are many small rocky islands. Sable Island lies 85 miles out in the open Atlantic. It is a chain of sand dunes, 20 miles long and a mile wide, resting on a more elevated part of the submarine banks, and forming a great danger to shipping. Lighthouse and life-boat men are the only inhabitants.

Configuration.—The surface of the province is rather irregular, being formed of ridges, often diffuse and indefinite, which run more or less parallel to the long axis of the peninsula, and intervening plains and valleys. These ridges, which nowhere rise more than 1,200 feet above the sea, are formed, like those of Newfoundland, by the outcrops of harder rocks. The highest range, known as the Cobequid Mountains, runs from the Bay of Fundy eastward to the Gut of Canso. A high bold ridge of trap, known as North Mountains, forms the southern shore of the Bay of Fundy, extending from Brier Island to Cape Blomidon, on the south side of which, underlain by Triassic sandstone, is the Annapolis valley, the garden of the province. Farther south, where the country is underlain by Cambrian schists, quartzites, and intrusive granites, agricultural land is mainly confined to the river valleys.

Climate.—The climate of this and the adjoining provinces of New Brunswick and Prince Edward Island is more humid and much more variable than that of central Canada, and fogs are common along the northern and eastern coasts, where the cold Arctic currents hug the shore.

People and Industries.—Nova Scotia was probably the land discovered by Lief Ericsen, the Northman, in A.D. 1000, and it was rediscovered by Cabot in 1498, shortly after which its shores and harbours were resorted to by French and Portuguese fishermen. In 1605 the French founded the first European settlement on the shores of Annapolis basin, and

for the next century, until the Peace of Utrecht was signed between France and the United Kingdom, Acadia (French, Acadie) remained in the hands of the French ; then under the name of Nova Scotia it became a British colony and entered the Dominion of Canada on its formation. Most of the present population have been born in the province, but their ancestors were immigrants from different parts of Great Britain. Living within the sound of the sea, and near a coast indented with many good harbours, they naturally turn to the ocean for their means of subsistence. The fisheries therefore, especially of cod and lobsters, form the most important industry in the province. More than 14,000 boats and vessels and 27,000 men are engaged in this industry.

In the northern part of the province coal mines are extensively worked, the total amount raised in 1901 being 4,200,000 tons, while in the southern portion of the province gold is mined. Iron and gypsum are the other chief mineral products.

Halifax, the capital, is situated about the middle of the south-east coast, on a magnificent natural harbour, the nearest to Europe on this continent that is open and free of ice all the year round. It is an important coaling station for the British fleet, and is strongly fortified and garrisoned by Imperial troops.

PRINCE EDWARD ISLAND

Position and Surface.—Prince Edward Island, the smallest province in the Dominion of Canada, lies within the Gulf of St. Lawrence, between latitude 46° and 47° N., being separated from New Brunswick and Nova Scotia by Northumberland Strait which is only ten miles wide at its narrowest point. The island is 145 miles long, with a breadth of from 5 to 35 miles. Its coast is very irregular, projecting in long low points, and cut into deep bays, many of which have bars of sand stretching across them, though these bars are usually broken through sufficiently to allow vessels of light draught to enter. The island is underlain by soft red sandstones of Permo-Carboniferous and Triassic age, which weather down readily and evenly, and on this account the surface is without strongly marked prominences and nowhere rises more than 500 feet above the sea.

Resources and People.—The soil, like the underlying rock, is red in colour, and is very fertile, so that agriculture occupies the attention of the people to a large extent. Potatoes and oats are the chief products, but cheese and butter are also now becoming important. Many fine horses are also reared. Next to agriculture fishing is the chief industry, the lobster-fishing being the most important, while the oyster-beds furnish more than half the oysters collected in Canada. The province is the most thickly peopled in the Dominion, the average density being 54 to the square mile. The people are mostly native born, but about half are of Scottish descent. The province joined the Dominion in 1873. *Charlottetown*, the capital, is situated on an excellent harbour on the south coast.

NEW BRUNSWICK

Position and Surface.—New Brunswick is roughly rectangular in shape with a greatest length from north to south of 205 miles. Exclusive of islands it lies between 45° and 48° N., being thus in the same latitude as central France, or southern Hungary. It has land boundaries with the province of Quebec on the north, the State of Maine on the west, and the province of Nova Scotia at the isthmus of Chignecto in the east. Its coasts face the Gulf of St. Lawrence and the Bay of Fundy. There are many good harbours, though the east coast is for the most part low, with outlying sandy shoals. Bay Chaleur, to the north, is 85 miles long, and free of rock and shoals, while the Bay of Fundy on the south is noted as having the highest tides in the world, the spring tides at the head of the bay rising 50 feet.

The central tract, underlain by rocks of Carboniferous age, is a low-lying plain, seldom rising more than a few hundred feet above the sea, and sloping gently towards the east coast. Both it, and much of the higher country in the north-west portion of the province, underlain by Silurian rocks, are well adapted for agriculture, but as yet only a small portion is cultivated. The country underlain by disturbed and altered crystalline and Cambrian rocks along the south coast, and stretching diagonally north-eastward through the province, is much more rugged and broken, the latter belt rising into numerous high peaks ; Bald Mountain, the highest, reaches 2,470 feet. The whole country, both highlands and lowlands, is almost everywhere covered with a forest of spruce (*Picea alba*).

Rivers.—New Brunswick is a land of many and beautiful rivers, which flow either southward into the Bay of Fundy or eastward into the Gulf of St. Lawrence ; several of them are navigable by river steamers. The St. John, 450 miles long, rises in the State of Maine, and at its mouth it flows through a rocky gap only 400 feet in width, where, at ebb tide, there is a heavy fall towards the harbour, while at flood tide there is a fall in the opposite direction. Four times a day, at half tide, ships can pass in or out through the narrow gap. Above this reversible fall the river is navigable for river craft for 212 miles to Grand Falls.

People and Resources.—The province was originally settled by the French, but the present inhabitants are chiefly descendants of British emigrants. Hitherto the forests have been the chief sources of wealth to the people. Pine was formerly abundant, but has now become very scarce, the forests being almost entirely composed of spruce. Only the larger trees are cut, while the smaller ones are carefully preserved, so that in this way any district can be economically "cut over" every ten or fifteen years. Fishing is the industry of second importance, though it is chiefly carried out along the shore, but few vessels being engaged in deep-sea fishing. A considerable number of people are engaged in agriculture, all the ordinary products of temperate climates being produced.

Towns.—*St. John*, the largest and most important commercial city in the province, is situated on a rocky peninsula where the St. John river flows into the Bay of Fundy. It has an excellent harbour, open all the year round, for in winter it is kept clear of ice by the tides, which here rise 25 feet. It is thus busy in winter when the St. Lawrence is frozen. In the days of wooden ships St. John was a famous ship-building town, and even now a very large number of vessels are owned in the city. *Fredericton*, the capital of the province, is situated on the St. John river, 86 miles from its mouth, and the tide ascends the river to a short distance above it. *Moncton*, on the Petitcodiac river, is a considerable manufacturing centre.

QUEBEC

Position and Boundaries.—The province of Quebec lies between 59° and 79½° W., and between 45° and 53° N. It is bounded on the west by the province of Ontario and a short section of the east coast of Hudson Bay; on the south by the States of New York, Vermont, New Hampshire, and Maine, and the province of New Brunswick; on the east by the Gulf of St. Lawrence and that portion of Labrador attached to Newfoundland; and on the north by the district of Ungava. Its total area is about one-sixth less than the combined areas of France and Germany.

Its coast line, with the exception of 100 miles on Hudson Bay, is entirely confined to the Gulf and Estuary of the St. Lawrence. The north shore, from the Strait of Belle Isle westward, is bold, rocky, and quite bare of trees as far as Cape Whittle, beyond which it becomes slightly lower; trees appear in some of the valleys, and in a few places small patches of land have been brought under cultivation. Close to the shore are many bare rocky islands. The south shore of the estuary is formed of bold, rocky hills, most of which are covered with forest.

Of the islands included in the province the Magdalens, a cluster of rocky knolls, often connected by bars of sand, very dangerous to shipping, rise in the centre of the southern half of the Gulf of St. Lawrence. Anticosti, which lies in the mouth of the estuary of the St. Lawrence, is 140 miles long, but has no good harbours, and is almost uninhabited.

Configuration.—The province is naturally divided into three parts.

(1) The Laurentian Plateau is an undulating rocky country north of the St. Lawrence, lying between 500 and 2,000 feet above the sea, chiefly underlain by granites, gneisses, and other rocks of Laurentian age, while here and there are areas underlain by highly altered sediments of Huronian age. In the vicinity of lakes St. John and Mistassini small outliers of comparatively unaltered Cambrian and Silurian rocks are also included. The region has all been severely glaciated and there is little residuary soil remaining anywhere. The summits of the low, rounded hills are bare, while the depressions are either occupied by irregular lakes of beautifully clear water, or are filled with stony clay,

which is usually covered with a scattered and stunted forest of spruce and larch, and a deep bed of moss. On the better-drained land, along the streams and lakes there are often extensive forests of large pine and spruce. Seen from the valley of the St. Lawrence the edge of this plateau has the appearance of a range of low rounded mountains, to which the name Laurentide Mountains has been applied. Among the highest points are Les Eboulements, 2,547 feet, and Trembling Mountain, 2,380 feet.

The streams flowing from the small lakes form a succession of quiet, lake-like reaches of water separated by short, rapid *chûtes* or falls. This feature, which is characteristic of most of the streams throughout the great Archæan continental nucleus, has rendered it possible to travel very extensively in canoes or small boats, which with their cargoes may be carried on "portages" over narrow rocky ridges, and past intervening falls. Most of the streams flowing southward to the St. Lawrence are of this type until they reach the edge of the plateau, or "Fall line," where they plunge in one or more heavy falls to the plains below. Montmorency Fall, near Quebec, 224 feet high, is a fine example of these cataracts.

(2) The St. Lawrence Plain has an area within the province of about 10,000 square miles. It is a long and comparatively narrow belt between the foot of the Laurentian Plateau and the highlands south of the river. Beginning a short distance below the city of Quebec it gradually rises, until, at the west end of the province, it has a maximum elevation of between 300 and 400 feet above the sea. It is underlain by more or less flat-lying Silurian limestones and sandstones. Towards the close of the Glacial Epoch, when the land was much lower than it is at present, the estuary of the St. Lawrence extended far beyond the site of the present city of Montreal, and a varying thickness of sand and clay was deposited in it. Since the land has been again uplifted these sands and clays form the fertile soil on which the agricultural prosperity of the province depends. On this plain a few hills of trappæan rock, such as Mount Royal behind Montreal, rise above the general level.

(3) The Highlands south of the St. Lawrence form the northern continuation of the Appalachian Chain which extends northward through the eastern United States. They are known as the Notre-Dame Mountains in the southern portion of the province, and the Shickshocks in the Gaspé peninsula, the highest points in the latter portion of the range rising to nearly 4,000 feet. They are formed of parallel ridges of rock, usually standing at high angles, and varying in age from Archæan up to Devonian. Much of the country is thickly forested. South of the St. Lawrence, lakes are not numerous and all the principal streams run in the moderately high country beyond the Notre-Dame and Shickshock Mountains and flow northward through these mountains in deep, narrow channels.

Climate.—The climate is continental. The winters are clear, with a mean temperature of 14° F., while the summers are warm and bright, with a mean temperature of 60° F. The average precipitation is about

36 inches per annum. In the southern portion of the province all the ordinary cereals usually grown in temperate climates come to perfection.

History and People.—The discovery of Quebec dates from 1534, when Jacques Cartier entered the St. Lawrence river, but it was not until 1608, when the city of Quebec was founded as a fur-trading station, that any successful attempt was made at settlement. From that time onwards for a century and a half, settlers from France spread over the country, most of whom were engaged in the double occupation of collecting rich furs from the Indian hunters, and clearing and tilling the fertile soil. In 1760, during the Seven Years' War, the country fell into the hands of the British through the capture of Quebec by Wolfe. In 1774 the French, who at that time numbered 70,000, were assured by the "Quebec Act" the right to be governed by their own civil laws, which right they still enjoy. Eighty-five per cent. of the people of Quebec province are of French race and Roman Catholic religion, and the French language is used officially as well as English.

Resources.—Most of the population are engaged in agriculture; oats, barley, wheat, maize, hay and tobacco are the chief products, while fruits, such as apples, pears and plums, are extensively grown. Horses and cattle are also raised in large numbers, and much attention is paid to the making of cheese and butter. The timber industry is next in importance to agriculture, white pine, spruce and larch being the principal woods brought into the market. Fishing is important in the Gulf of St. Lawrence. Gold is found in alluvial deposits on the Chaudière river. Asbestos is largely mined in the country south of the St. Lawrence, while copper, iron, mica and graphite are also worked to some extent.

Towns.—*Montreal*, founded in 1642, is situated on an island at the junction of the Ottawa and the St. Lawrence rivers at the head of ocean navigation, any vessel that can enter the harbour of New York or Boston being able to steam up to its wharves. The extensive system of inland navigation, which reaches into the very heart of the continent, begins above the city, and the St. Lawrence is crossed by its first bridge. It is the principal seaport, and the largest city in the Dominion, and is the main eastern terminus of the Grand Trunk and Canadian Pacific railways. It is an important manufacturing centre. The population is more than half of French extraction.

FIG. 342.—*Site of Montreal.*

Quebec, one of the oldest cities on the continent, was founded by Champlain in 1608. The present city is situated partly on a bold promontory on the north side of the St. Lawrence, and partly at the foot of the cliffs close to the river bank. In front of it is a magnificent basin, in which the largest ships afloat can ride in safety. It is the capital of the province, has beautiful parliament buildings, an important Roman Catholic university, and its citadel, situated on the summit of the rocky cliff overlooking the river, has often been spoken of as the "Gibraltar of America." The population is mostly of French descent, and French is more spoken than English. *Hull*, on the Ottawa river, and *Sherbrooke*, near Montreal but south of the St. Lawrence, are also thriving manufacturing towns.

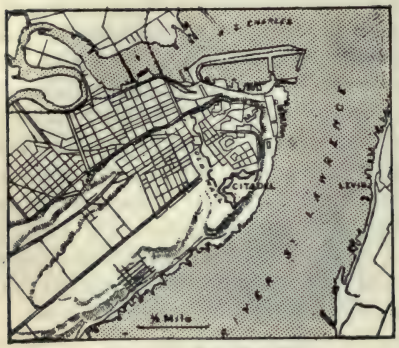

FIG. 343.—*Site of Quebec.*

ONTARIO

Position and Boundaries.—The province of Ontario lies between 42° and 52° N., and 74° and 95° W. It is bounded on the south and south-west by the States of New York, Michigan, and Minnesota; on the east by the province of Quebec, and on the north and north-west by the district of Keewatin. Its total area is somewhat larger than either France or Germany, and its greatest length from east to west is about 1,000 miles.

The province lies almost entirely inland, for the only place where it reaches the sea is on the shallow coast of Hudson Bay, with no harbours that will accommodate large ocean-going vessels. But most of its southern border lies along the Great Lakes, which, with their connecting rivers, give it a shore line, accessible for about eight months of the year, of 1,700 miles. The steamer traffic on the great lakes may be judged from the fact that a greater tonnage passes through the "Soo" canals, which avoid the rapids at Sault St. Marie between Lake Huron and Lake Superior, than through the Suez Canal. The Canadian shores of Lakes Ontario, Erie, and part of Huron are low and moderately regular. The northern shore of Lake Huron lies along the edge of the Laurentian Plateau, and is fringed

FIG. 344.—*The "Soo" Canals.*

with a vast number of small rocky islands ; the northern shore of Lake Superior is very bold, with deep bays and comparatively few islands, all of which are rugged and picturesque.

Configuration.—The surface contour is but slightly accentuated, most of it being less than 1,200 feet above the sea, while very few, if any, points rise to a height of 2,000 feet. It is divided naturally into four main subdivisions. (1) A relatively small area sloping gently northward towards Hudson Bay, and underlain by flat-lying Silurian and Devonian limestones. This is very largely covered with swamp or morass, and much of it is thinly wooded with small spruce and larch. Except a few fur-traders and missionaries it has no white inhabitants. (2) The Laurentian Plateau, a continuation westward of the same region in the province of Quebec, forms by far the largest part of the province, though most of it is yet a wilderness. It is almost entirely underlain by Laurentian and Huronian rocks intricately folded and squeezed together, the former being essentially granitic in type. The Huronian rocks consist of sandstones and clays associated with traps and other igneous and intrusive rocks, and are of especial importance on account of the rich minerals associated with them. Where the character of the rock varies greatly within comparatively short distances, as near the north shore of Lake Superior, there are high hills and deep valleys, but in other places the surface is mamillated with many low rounded hills and shallow rock-bound basins filled with clear water or mossy swamps. Usually the summits of the hills are almost naked rock, supporting but a stunted forest growth, the valuable forests of spruce and pine being confined to the richer and moderately well-drained valleys ; but near the great lakes the rock is often covered by extensive deposits of sand and clay, laid down in the beds of these lakes when, towards the close of the Glacial Epoch, their waters stood at much higher levels than at present, and on these lacustral deposits grow some of the finest pine forests in Canada. The southern end of the Laurentian Plateau crosses the Ottawa river at the Chats Rapids and strikes southwards to the Thousand Islands on the St. Lawrence. (3) East of this boundary comes the western extension of the St. Lawrence Plain underlain by flat-lying Cambro-Silurian rocks, over most of which is a Pleistocene deposit of marine sands and clays. As yet it is not very thickly settled except along the banks of the rivers. (4) From the Thousand Islands the southern edge of the Laurentian Plateau strikes westward to Matchedash Bay, at the south-eastern extremity of Georgian Bay, and south of this line is the district known as the Ontario peninsula which is the most fertile and thickly peopled portion of Canada. It is underlain by flat-lying Silurian and Devonian rocks, chiefly limestones, over which there is almost everywhere spread a covering of till or glacial detritus from the old northern ice-sheets ; this till forms some of the richest soil to be found on the continent. In places the till is again overlaid by lacustral deposits formed in the beds of the great post-glacial lakes. This district is divided by

the Niagara escarpment, a bold cliff of Silurian shales and limestones, which crosses the Niagara river at Queenston, skirts the south shore of Lake Ontario to Hamilton, and thence strikes northward to the Bruce Peninsula, between Lake Huron and Georgian Bay, finally forming the backbone of Manitoulin Island in Lake Huron.

Smaller Lakes and Rivers.—Lake Nipigon, with an area of 1,450 square miles, is probably the largest of the many lakes occupying depressions in the Laurentian Plateau, while the Lake of the Woods (Fig. 47), on the extreme western edge of the province, is of about equal size. Along the edge of the Laurentian Plateau a narrow chain of lakes has been formed, among which are those of Balsam and Scugog. In the Ontario peninsula, north of the Niagara escarpment, there are a few very picturesque lakes, Lake Simcoe being the largest, and well known as a summer resort.

The streams of Ontario province belong to three different drainage-areas—(1) those flowing southward into the great lakes; (2) northward into Hudson Bay, these being the longest in the province; and (3) westward into Lake Winnipeg.

History and Resources.—Ontario was first settled in 1776, after the close of the American Revolution, by United Empire Loyalists, men who had left the United States, and their property there, for the love of the United Kingdom and British institutions. That patriotism was strengthened in 1812 when the armies of the United States invaded the country and were repulsed on every side after heavy loss. In 1791 the district was erected into a province, and since that time the population has grown quietly, mainly in the peninsula. Four-fifths of the inhabitants are Canadian born.

A large number are engaged in agriculture, farming being the most important industry in the province. Wheat, oats, barley, maize, potatoes and hay are the principal crops. Stock-raising is also extensively carried on, and wool is of some importance. Cheese-making and dairying are also great and growing industries. Fruit is extensively grown, the principal kinds being apples, pears, peaches, plums and grapes. The chief fruit districts are in the peninsula near the shores of the great lakes. Lumbering is next in importance to agriculture, the timber-lands being leased for this purpose by the Government to private companies or individuals. The fisheries are confined to the great lakes where about 3,000 men are employed.

With the exception of petroleum, the mineral industries of the province are yet in their infancy. Nickel ores occur in extensive deposits near Sudbury on the line of the Canadian Pacific Railway, and an almost unlimited supply of the metal could be obtained if there were a sufficient demand. Copper is usually associated with the nickel in these ores. Gold is found in the Huronian rocks of the western portion of the province, and it is not improbable that many rich gold mines will soon be worked there.

Natural gas exists at several places in the southern portion of the peninsula. Salt and gypsum are also produced in considerable quantity.

Towns.—*Ottawa*, the capital of the Dominion, is beautifully situated on the south bank of the Ottawa river just below the Chaudière Falls. The Dominion Government buildings are of imposing character and finely situated. Ottawa has the most important lumber interests of any city in Canada. Several railways pass through it, and the Rideau Canal joins it to Kingston on Lake Ontario. *Toronto* is both the commercial and political capital of the province. It is built on a series of low terraces on the north shore of Lake Ontario between the mouths of the Don and Humber rivers, and in front of it is an excellent harbour about 3½ square miles in extent, formed by a long sandy island which projects westward from the foot of the cliffs at Scarboro' Heights. It was founded by Governor Simcoe in 1793, on the site of an old French fort that had been built forty-four years before. It is the seat of numerous manufactories, several large industrial institutions, and being an important railway terminus is the principal distributing centre of the province. It is also a banking centre, many of the largest financial institutions in the Dominion making it their headquarters. *Hamilton*, situated at the head of a sheltered bay at the west end of Lake Ontario, is a manufacturing town. *London* is situated on the Thames river, in the centre of one of the finest farming districts in the province. *Kingston*, at the east end of Lake Ontario, is the oldest city in the province, and besides other educational institutions it contains a military college.

MANITOBA

Position and Surface.—The province of Manitoba lies in the very centre of the continent, being almost equidistant from the Atlantic and Pacific coasts, and from the Arctic Sea and the Gulf of Mexico. In outline it is almost square, with sides about 270 miles in length. It extends along the 49th parallel of latitude, which is here the boundary with the United States (Minnesota and North Dakota) from the Lake of the Woods westward to the meridian of 101°, which forms the western boundary. On the east it is bordered by Ontario, and the North-West Territories lie on the north and west.

The province falls naturally into three principal divisions, running in a general north-westerly and south-easterly direction. (1) The Laurentian Plateau, which lies east of the east shore of Lake Winnipeg, with its characteristic undulating rocky surface, dotted with small lakes, and traversed by many crooked, irregular streams. It is chiefly underlain by Laurentian rocks of granitic type. (2) The Lacustral Plain, or First Prairie Steppe, which includes rather more than half of the province, occupies part of the basin of an ancient glacial or post-glacial lake, which has been called Lake Agassiz. The thick beds of clay and silt deposited in that lake now form the rich wheat-producing soil of the

Red River valley. It is almost entirely underlain by flat-lying Silurian and Devonian limestones, and in its southern portion the original inequalities of the rocky surface have been almost entirely levelled up by the lacustral deposits, while further north the rocky surface was more irregular, and was not so completely covered with clay, having long wide ridges and hollows, the most important of the latter being now occupied by Lakes Winnipeg, Winnipegosis, and Manitoba. Much of the country south of these lakes is open grassy prairie, while farther north it is more or less thickly wooded with spruce and poplar. (3) The Manitoba Escarpment borders the lacustral plain on the west, rising from 800 to 1,400 feet above the plain at its base. West of this escarpment comes the Second Prairie Steppe, in which the relief is more strongly pronounced, the rivers often flowing in valleys which they have cut to a depth of several hundred feet, while many of the stony hills are rough and steep. Much of the soil is of excellent quality, and in the southern portion of the province will grow large crops of wheat ; further north and on the higher tracts abundant crops of oats, barley, and the more hardy cereals and roots can be grown. This plateau is underlain by soft shales and sandstones of Cretaceous age.

Winnipeg river, a large stream, broken up by many rapids and falls, flows into Lake Winnipeg from the Laurentian plateau on the east. The Red River of the North rises in the United States and flows northward to empty into the south end of the same lake, while its tributary, the Assiniboine, drains much of the western portion of the province.

History and Towns.—The retired employés and dependents of the North-West and Hudson's Bay Fur-trading Companies formed the nucleus of the present population of the province, originally called the "Red River Settlement." In 1870 the population was about 12,000, while in 1901 it had risen to 255,000. Almost all the inhabitants, who include many immigrants from the United States as well as from Europe, derive their support, directly or indirectly, from agriculture. The principal crops are wheat, oats, barley, potatoes and flax, and of these the exports consist mainly of wheat, the arrangements for collecting and transporting which are highly organised. In the more northern parts of the province many farmers devote themselves to raising cattle, and to the making of cheese and butter. White-fish of the finest quality are caught in the large lakes of the province, and of late years the fishing industry has assumed considerable proportions.

Winnipeg, the capital, and chief city of the province, is situated on the level lacustral plain, at the confluence of the Red and Assiniboine rivers. It is the distributing point and commercial focus of the whole of the Canadian North-West, one of the most important stations on the Canadian Pacific Railway, and a railway centre for lines from the United States as well. *Brandon* and *Portage la Prairie* are prosperous towns in the centre of rich wheat-growing districts on the Canadian Pacific line.

BRITISH COLUMBIA

Position and Area.—British Columbia, stretching from the Rocky Mountains to the sea, is the largest province in the Dominion, having an area three times as large as the United Kingdom. Its greatest length, measured in a north-westerly direction, is 1,250 miles. It is bounded on the south by the United States, the parallel of 49° separating it from Montana, Idaho and Washington. On the west the Pacific Ocean, and farther north a narrow strip of the United States territory of Alaska, are the boundaries. On the east and north it is bordered by the North-West Territories, which separate it from the eastern provinces.

Coasts.—Viewed as a whole the coast has a general trend in a north-westerly direction, but in detail it is very irregular, reaching back into deep, narrow fjords, and fringed by a maze of islands of all sizes. The fjords and straits are submerged valleys both in line with and transverse to the general direction of the mountain ranges. Of the fjords, Dr. G. M. Dawson writes: "Their width is usually from one to three miles, their shores rocky and abrupt, and rising towards the heads of the longer fjords into mountains from 6,000 to 8,000 feet in height. The water is deep, usually much too deep for anchorage, but at the head of each arm a delta-flat, formed by an entering river, is commonly found. Many good harbours exist along the coast, but the two best and most important of those on the mainland are Burrard Inlet, upon which the city of Vancouver is built, and Port Simpson, near the northern end of the coast of the province."

Vancouver Island is separated from the mainland by the Strait of Juan de Fuca on the south, and the Strait of Georgia and Queen Charlotte Sound on the north-east, these two being connected by narrow channels which at Seymour Narrows are less than half a mile in width. It has a length of 285 miles, and a greatest width of 80 miles.

Mountains.—British Columbia is essentially a country of mountains. In the portion of the province north of latitude 54°, the breadth of the Cordillera or mountain belt, from south-west to north-east, is about 400 miles. The mountains, as a rule, run in a north-westerly and south-westerly direction, and the two most conspicuous and important ranges run along opposite sides of the rhomb, the Rocky Mountains proper along the eastern side, and the Coast Range along its western side. At the international boundary the Rocky Mountains have an average width of about 60 miles, and many of the peaks reach heights of 10,000 feet, being snow-capped and abounding in fine glaciers. Further north the range decreases both in width and height, until in the vicinity of Peace river, in latitude 56°, it is only 20 miles wide, and but few of its peaks rise above 5,000 or 6,000 feet. This range is composed of stratified limestone, quartzites, and other rocks from Cambrian to Cretaceous; granites and other crystalline rocks are almost entirely absent. The Rocky Mountain range is bounded on the west by the great Columbia-

Kootenay valley, which in its course north-westward is occupied successively by the upper portions of the Kootenay, Columbia, Fraser, Parsnip, Findlay, and other rivers, which usually break through its western border to the sea. South-west of this great valley are the Selkirk and Gold ranges. The gold and silver recently discovered in southern British Columbia occur in these mountains. Between the Gold and the Coast ranges, the interior plateau attains an average width of 100 miles. To the south, it does not much exceed, on the average, a height of 3,000 feet, but it gradually decreases to 2,000 about latitude 54°, beyond which it is cut off by transverse ranges of mountains. In places it is so deeply dissected by streams and atmospheric agencies that it has lost all semblance of a plain, but in other places there are extensive almost level tracts, among which is much land suitable for ranching and agriculture.

The Coast Range begins about latitude 49°, and runs north-westward, near the coast, for about 900 miles, with an average width of about 100 miles. Many of its summits rise to heights of 7,000 and 8,000 feet, while its submerged valleys form deep fjords. Its seaward slopes, clothed with magnificent forests, rising to snow-capped peaks form some of the grandest scenery in the world. The mountains forming the backbone of Vancouver and Queen Charlotte islands are a subsidiary and partly submerged chain of the main range. The Coast Range is chiefly composed of granitic and highly altered sedimentary rocks.

Hydrography.—In conformity with the structural lines of the country, the numerous lakes are long and narrow, lying either between the mountain ranges, or in the bottoms of the deeper parts of river valleys, which have been obstructed in some way. The Peace and Liard rivers rise in the north-eastern part of the province, and drain a large area eastward into the Mackenzie river. A small area in the extreme northern portion is drained by the headwaters of the Yukon. The remaining rivers flow towards the Pacific coast in very irregular channels, running between and across the ranges, and often doubling back parallel to their upper courses. Of these the principal is the Fraser, which rises on the western slopes of the Rocky Mountains, close to the source of the Athabasca, and flows at first north-westward, and then southward, to empty into the Strait of Georgia, having a total length of about 750 miles. The upper waters of the Columbia river flow through the province, the river being twice crossed by the Canadian Pacific Railway. The Skeena and the Stikine are both large rivers, navigable for small steamers in their lower courses.

Climate.—The climate varies from temperate insular on the coast and islands, to extreme continental on the high interior uplands. The total annual precipitation in the valleys of the interior is about 15 inches; at Victoria it is 40 inches, while in some parts of the coast to the north it exceeds 100 inches. It is thus, in some parts of the interior, possible to grow crops only with the aid of irrigation, while along portions

of the coast the excessive humidity practically precludes agriculture (see Fig. 338).

History and People.—The coast of British Columbia was discovered and partly explored by Spanish voyagers, and by Cook in the course of his last voyage in 1778. In 1793 Alexander Mackenzie first crossed the interior on his journey from Lake Athabasca to the Pacific Ocean, and early in the nineteenth century David Thompson explored and opened up trade routes into the country from the upper waters of the Saskatchewan and Athabasca rivers. In 1849 Vancouver Island was granted a Governor, and in 1856 it elected its first legislative body. The discovery of gold in 1857 brought a rush of population to the province, and in 1866 Vancouver Island and the mainland were united under the name British Columbia. In 1871 it entered the federal union of the Dominion, one condition of federation being the construction of a railway to the eastern provinces.

Mines.—The wealth of the people depends very largely on mineral products. Gold was first discovered in auriferous sands and gravels on the Thompson and Fraser rivers and their tributaries in 1857 and 1858, and in the early "60's" stories of the rich finds in the remote Cariboo district were common throughout the English-speaking world. Until recently this gold was almost entirely obtained from placer diggings, but rich gold-bearing lodes have been found in the West Kootenay district, which has consequently been made accessible by railways and steamboats, so that the dwindling placer mines of the Cariboo district are thrown in the shade by the rich and rapidly developing lode mines of the south. In 1897, silver derived almost entirely from the silver-lead mines of the West Kootenay district, jumped to the first place among the mineral products, the total silver product exceeding in value that of gold. The amount of lead produced is very considerable, and some copper also is obtained. The coal mines of Vancouver Island have long held an important place on the Pacific coast, as they not only supply the province itself, but lead the market in the coast cities of the adjoining republic. Large coal-fields also exist in Queen Charlotte Islands, and in the interior, notably in the Crow's Nest Pass of the Rocky Mountains, through which a railway has been carried to the Kootenay gold and silver mining districts.

Resources and Towns.—Throughout the province there is a vast extent of country covered with forest, chiefly of conifers, among which the most valuable tree is the Douglas fir. Along the coast, and on Vancouver Island, there are many saw-mills which are supplied with this fir from the adjacent forests, and from which lumber is largely exported. The fisheries are another important source of wealth to the people. Salmon abound in many of the streams, and are caught and put up in cans for export in enormous quantities. Halibut, herring, rock-cod, &c., are also caught off the coast. The pelagic sealing fleet is also largely owned in this province.

There is much good agricultural land in the southern portion of the

interior plateau, on the deltas, and in the valleys of the principal rivers where, in addition to cereal crops, fruit of many kinds is now beginning to be successfully cultivated. Difficulties of transport have heretofore limited farming, but stock-raising is an industry of considerable importance in the southern part of the interior.

Victoria, the capital of the province, is situated on a good harbour at the south end of Vancouver Island. The provincial Parliament House is one of the finest buildings in Canada. Three miles to the west is the great naval harbour *Esquimalt*, the principal station for the North Pacific Squadron of the British fleet. *Vancouver*, the western terminus of the Canadian Pacific Railway, is situated on the south shore of Burrard Inlet, one of the best harbours on the Pacific coast, and the point of departure of regular lines of steamers to Japan and New Zealand. *New Westminster*, the first capital of the mainland province, a short distance up the Fraser river, was founded in 1858. *Rossland*, on the gold-fields near the Columbia river, has sprung into existence as a city second in population only to Vancouver and Victoria, and provided with railway communication with the United States. In all the towns of the province there is a large Chinese element, most of the domestic servants and many labourers being Chinamen. Japanese immigrants are also met with ; but in spite of the mixture of races British Columbia is perhaps the most English of all the provinces of Canada in the life of the people as well as in the climate.

FIG 345.—*Vancouver and Victoria, B.C.*

THE TERRITORIES

Territories.—Outside of the organised provinces of the Dominion there are vast areas which have long been known as the North-East and North-West Territories. Recently these have been divided into districts, some of which are provided with representative government, while others, whose only inhabitants are a few scattered Indian hunters, are governed by the Dominion Parliament at Ottawa. These districts are nine in number.

Ungava.—The district of Ungava comprises the northern portion of the Labrador peninsula, north of the province of Quebec, except the eastern strip of coast which for 700 miles is under the jurisdiction of Newfoundland. The western side of the peninsula is the rocky eastern shore of Hudson Bay, indented by many deep narrow bays, and skirted by a large number of rocky islands. The interior is a gently undulating plateau underlain by Archæan and highly altered Cambrian rocks. The main watershed is about the middle of the southern boundary of the district.

and from there the rivers flow northward, westward, and eastward, and also southward through the province of Quebec. On the long Hamilton river, which flows south-eastward to the Atlantic, are the Grand, or McLean Falls, where the stream plunges 300 feet over a cliff into a narrow rocky gorge. The country is more or less sparsely wooded as far north as the south end of Ungava Bay.

Keewatin.—The south-western and western sides of Hudson Bay, and the country adjoining, are comprised within the great district of Keewatin. Its coast on Hudson Bay is exceedingly low and flat south of 61° N. lat., while north of that latitude it becomes much more bold and rocky. The lagoon at the mouth of the Churchill river is the only good harbour on the more southern portion of this coast, and it remains unfrozen on the average for five months in the year. Most of the country is underlain by Archæan rocks. South of 60° N. the district is generally forested, scattered woods of small black spruce and larch growing on swampy tracts. North of 60° N. it is almost entirely treeless, often forming an undulating stony plain, thinly covered with short grasses and sedges. Countless herds of a small variety of reindeer roam over these plains. These are almost the only living creatures in this country, the fur-bearing animals being confined to the forests further south. The district is entirely beyond the limits of settlement, and, as in Ungava, except a few white fur-traders the only inhabitants are Indians and Eskimo.

The Organised Districts.—Assiniboia, Saskatchewan, and Alberta, lie between Manitoba and part of Keewatin on the east, and British Columbia on the west, and between latitudes 49° and 55°. They are spoken of as the organised districts, for they have a Lieutenant-Governor, an elected Parliament, and an Executive Council to attend to their local affairs, while at the same time they have representatives in both Houses of the Dominion Parliament in Ottawa.

At its north-eastern corner the district of Saskatchewan touches the hummocky Laurentian plateau, and is underlain by rocks of Laurentian and Huronian age. South-west of this is a narrow strip underlain by Silurian limestones, while the whole remaining portion, to the foot of the steep cliffs of the Rocky Mountains, is underlain by soft clays and sandstones of Cretaceous and Tertiary age, often covered by a thick mantle of drift. The rise from the Archæan plateau to the foot of the mountains averages 5½ feet to the mile. This rise is not regular, though it indicates the general slope of the country, but is most pronounced along the line of the Manitoba escarpment which marks approximately the eastern edge of the Cretaceous rocks, and along the Missouri Côteau, which separates the second from the third or highest prairie steppe.

The Saskatchewan river, with its tributaries, drains the greater part of these districts. Most of its branches rise on the eastern slopes of the Rocky Mountains, some of the more northern ones being fed by glaciers, and, flowing eastward, unite into one great stream which empties into the

north end of Lake Winnipeg. At the mouth of the river is a heavy rapid, with a descent of seventy feet, but above this the main stream is navigable for river-steamers for 900 miles, while the south branch is navigable for 400 miles above its confluence. A small area in the south is drained southward towards the Missouri, while north of latitude 54° most of the country is drained northward either to the Mackenzie or to the Churchill rivers. The surface is very generally dotted with small lakes and ponds, usually shallow, which lie in hollows in the general covering of drift. Many of these are without outlet, and some are quite saline, chiefly from the presence of sulphate of soda.

The whole of Assiniboia, and large tracts in the south of Saskatchewan and Alberta are treeless, except in the deep valleys, consisting of grassy plains or prairies, which usually extend to the horizon on every side. Or the level plain may be varied here and there by sandy or stony hills, appearing as high ridges in the distance, but on closer approach dwindling to grassy downs. A few plateau-like elevations, such as the Cypress and Hand Hills, rise 1,000 feet or more above the surrounding plain. The total area of this prairie country north of 49° N., including the prairie portion of Manitoba, is about 193,000 square miles. North of the treeless prairies comes a belt of varying width, consisting of open grassy glades alternating with groves of poplar, north of which again is the coniferous forest, composed chiefly of spruce and larch.

People and Towns.—The inhabitants are partly Indians, while the remainder are immigrants from many parts of Europe and the eastern provinces of the Dominion. The attention of the people is almost entirely devoted to agriculture and raising live stock. In the more eastern parts of Assiniboia and in the partly wooded country near the banks of the Saskatchewan river, wheat, barley, and oats are grown to great perfection. In the drier country farther south and west, most of the people are engaged in the raising of cattle, horses and sheep. Extensive beds of coal and lignite underlie large areas, ensuring an abundant supply of fuel.

Regina, the capital of the North-West Territories, stands on a level plain on the line of the Canadian Pacific Railway and is the head-quarters of the North-West Mounted Police, who keep order over the whole region. *Calgary*, also on the railway, in the southern portion of Alberta, is the centre of the ranching country, and its handsome stone-built houses contrast with the wooden or iron dwellings common in newly-settled districts. A branch line runs north to *Edmonton*, on the Saskatchewan.

North-Western Districts.—The four districts of Athabasca, Mackenzie, Yukon, and Franklin, together make up a full third of the Dominion of Canada. With the exception of Yukon, all of these districts are without white inhabitants, except a few fur-traders who have gone out into the wilderness to barter with the Indian hunters. The Indian population is estimated at about 32,000. Athabasca and Mackenzie are essentially

similar in character. Their eastern half lies on the north-western extension of the Archæan plateau. Their western half is underlain by stratified limestones, shales, and sandstones, varying in age from Devonian up to Miocene. The north-eastern corner of Mackenzie lies within the area of the Barren Lands, beyond the limit of the growth of trees, while most of the remainder is covered with a forest of stunted spruce and larch, of no commercial value. In the south-western part of Athabasca there are open poplar woods, with some rather large tracts of open grassy prairie. Some portions of the country west of Athabasca have a height of 3,000 feet, while east of that river there are elevations of about 1,700 feet. From there the country has a gentle and fairly regular slope northward through Mackenzie to the Arctic Sea. The most conspicuous breaks in the general level of this plain are the cliffs on the north shore of Great Slave Lake, and the Copper Mountains, near the Coppermine river. The Athabasca-Mackenzie river traverses the whole length of the district. The furs secured by the Indians throughout the forests of this northern country are its principal source of wealth. Fish abound in the lakes and streams and furnish valuable supplies of food for the traders and Indians. Franklin consists of the islands of the Arctic Archipelago, varying in size from Baffin Land down to small reefs. These are underlain generally by rocks ranging in age from Archæan up to Carboniferous, the latter containing some good seams of coal, while in a few places Mesozoic and Tertiary rocks have been recognised. The greater part of the surface is not very high, and in general character is similar to the Barren Lands of the continent. Here the musk ox, polar bear, and reindeer have, as yet, a safe retreat. A few Eskimo are now the only inhabitants.

Yukon.—Yukon Territory lies between the northern limit of British Columbia and the Arctic Sea, and between the summit of the Rocky Mountains on the east, and the boundary of Alaska on the west. In general character it is a northern extension of the mountainous region of British Columbia, though the ranges are not so distinct or regular. The streams which drain it are nearly all tributary to one great river, the Yukon, which is navigable by river steamers for 2,400 miles from one of its sources in Teslin Lake to the Bering Sea. Since 1897 discoveries of rich deposits of placer gold on the tributaries of the Yukon have attracted a large number of prospectors and miners from all parts of the world to this remote region, where the gold of the Klondike river has led to the growth of the town of *Dawson*. The gold produced in 1900 and 1901 averaged £4,000,000 per annum in value. Access to Dawson is had by rail from the United States port of Skagway in Alaska over the mountains to the navigable upper waters of the Yukon. Yukon Territory, in consequence of its position in relation to the Pacific and the ameliorating effects of the prevalent westerly winds, is by no means so rigorous in its

climate as those parts of the continent further to the east. Except in the extreme north, the lowlands are generally wooded, and hardy crops may be grown with some chance of success almost to the Arctic Circle.

STATISTICS.

AREA AND POPULATION OF THE DOMINION OF CANADA.

Provinces.	Area in square miles.	Population. 1881.	1891.	1901.
Novia Scotia	20,600	440,572	450,396	459,574
Prince Edward Island	2,000	108,891	109,078	103,259
New Brunswick	28,200	321,233	321,263	331,120
Quebec	347,350	1,359,027	1,488,535	1,648,898
Ontario	222,000	1,926,922	2,114,321	2,182,947
Manitoba	73,960	62,260	152,506	255,211
British Columbia	383,300	49,459	98,173	178,657
Territories.				
Assiniboia	89,535			67,385
Saskatchewan	107,092		66,799	25,679
Alberta	100,000			65,876
Keewatin	756,000			8,546
Athabasca	251,300	56,446		6,615
Mackenzie	563,200		32,168	5,216
Yukon	198,300			27,218
Ungava	456,000			5,113
Franklin	Unknown			—
Great Lakes of St. Lawrence	47,400	—	—	—
Totals	3,653,950	4,324,810	4,833,239	5,371,315

POPULATION OF CHIEF TOWNS.

	1881.	1891.	1901.		1881.	1891.	1901.
Montreal	155,237	216,650	267,730	St. John, N.B.	41,353	39,179	40,711
Toronto	96,196	181 220	208,040	London, Ont.	26,206	31,977	37,981
Quebec	62,449	63,090	68,840	Vancouver, B.C.	—	13,685	26,133
Ottawa	31,307	44,154	59,928	St. Henri	6,415	13,413	21,192
Hamilton	35,960	48,980	52,634	Victoria, B.C.	5,925	16,841	20,816
Winnipeg	7,985	25,642	42,340	Kingston	14,091	19,263	17,961
Halifax	36,100	38,556	40,832	Brantford	9,616	12,753	16,619

AREA AND ELEVATION ABOVE SEA OF THE LARGEST LAKES.

	Area in square miles.	Elevation in feet.		Area in square miles.	Elevation in feet.
Superior	31,200	600'5	Ontario	7,240	245'5
Huron	23,800	580	Athabasca	2,850	690
Great Bear	11,400	340	Winnipegosis	2,000	828
Great Slave	10,100	520	Manitoba	1,710	810
Erie	9,960	572	Nepigon	1,450	850
Winnipeg	9,400	710			

AVERAGE ANNUAL TRADE (*in pounds sterling*).

	1871-75.	1881-85.	1891-95.
Exports	16,500,000	19,200,000	22,500,000
Imports	23,500,000	23,300,000	24,400,000

II.—NEWFOUNDLAND

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Coast and Surface.—The large island of Newfoundland, lying across the mouth of the Gulf of St. Lawrence, extends from 46½° to 51½° N. lat., separated from the mainland of Labrador by the Strait of Belle Isle, 12 miles wide, and from Cape Breton by Cabot Strait 60 miles wide.

It is roughly triangular in outline, each of its three sides being between 300 and 400 miles in length; but while the north-western shore is moderately straight, the southern and north-eastern shores are indented by many deep bays, and fringed with a great number of rocky islands, which form many magnificent harbours. The coast is for the most part bold and rocky, and its total length is about 2,000 miles. The large bays usually run in a north-easterly and south-westerly direction, and their shores are broken by many smaller bays. The bays of Notre-Dame and Bonavista on the north-east coast are marvellously fretted by little peninsulas and fringed with small islands. Heart's Content, on the north side of Trinity Bay, is the landing-place of the Atlantic cables. Burin Peninsula, with a length of 82 miles, lies between the great bays of Fortune and Placentia, while the peninsula of Avalon, in the south-east, on which the larger part of the population is settled, is almost cut off from the rest of the island by Placentia Bay on the south and Trinity Bay on the north, the neck of the peninsula being only three miles wide in its narrowest part. St. Mary's Bay and Conception Bay make great indentations into this peninsula.

The interior of Newfoundland is underlain chiefly by Archæan and early Palæozoic rocks, arranged in long folds in a general north-easterly and south-westerly direction, parallel to the north-west coast, the older and harder rocks forming the ridges, while the softer and later rocks occupy the depressions. The Long Range, on the west side, is the highest and most important of the ridges, varying in height from 1,000 to 2,000 feet. The undulating surfaces of the rocky hills are dotted with an immense number of small ponds and lakes, from which flow many brooks to form the larger streams, the most important of which are the Exploits and Sanchau, discharging on the north-east coast, and the Humber river, discharging into the head of the Bay of Islands on the west coast. The tops of the rocky hills and ridges are for the most part scantily wooded or barren, while the river valleys and the land at the head of the deep bays are usually thickly wooded with large and valuable timber, chiefly white pine, spruce, larch and birch.

Climate.—The Arctic current, bearing extensive fields of ice and many icebergs, flows southward past the east side of the island, and tends to lower the temperature in summer, but very extreme temperatures are unknown, the thermometer rarely falling below zero F. or rising above 85° F. Dense fogs often hang over the south and east shores, but these do not extend many miles inland, and the weather in the interior is usually clear and bright.

Resources and Industries.—Though there are large areas of good agricultural land in the interior, it has as yet been almost entirely neglected, for the surrounding ocean contains such an abundance of fish and seals that the catching and curing of them occupies almost the entire attention of the people. Early in March steamers and sailing vessels

put to sea heavily manned, and seek the ice-floes drifting down from the north, on which the seals have brought forth their young. The sealing season lasts from March 16th to April 16th. After the sealing is over the season for cod-fishing begins, and lasts from June to November. The vast submarine plateau which extends around the south and east shores of Newfoundland, known as the Grand Banks, and covered with a depth of from 10 to 160 fathoms of water, is the greatest fishing-ground for cod in the world, and ships of many nations congregate there to gather the rich harvest from the sea; and the bold and well-trained sailors from Newfoundland, being nearest to the Grand Banks, and provided with a plentiful supply of bait (capelin, squid, &c.), which swarm on their shores, come in for a full share of this harvest. The fish, when caught, are cleaned, salted and dried in the sun on stages, which may be seen almost everywhere. Herring, capelin, and other fish are caught in considerable quantity along the shore. Salmon are caught in the rivers, and of late years a considerable industry has grown up in the catching and canning of lobsters. Almost 90 per cent of the exports of Newfoundland consist of the products of the fisheries, more than half being dried codfish.

FIG. 346.—*Newfoundland and the Grand Banks. The French shore is shown by a double line.*

Iron pyrites, copper and iron ore are the principal minerals at present worked, the first-named being exported to England for the manufacture of sulphuric acid. Coal is reported to exist in considerable quantity, chiefly on the west side of the island, and lead and nickel are also said to occur. The timber is cut to some extent for local use.

Population and History.—Newfoundland was discovered by John Cabot in 1497, at which time it was inhabited by the Beothuks, or Red Indians, a tribe whose exact affinities are now unknown, for the last survivor is supposed to have died in the early part of the nineteenth century. The fame of the cod-fishing off its shores soon spread through the maritime nations of Europe, and many ships from France, Spain, Portugal and England resorted every year to the Grand Banks, using the many harbours of the island as bases of operations. In 1582 an English Governor was appointed, and during the next fifty years several futile attempts were made at colonisation. Then for more than a century

FIG. 347.—*The Badge of Newfoundland.*

and a half colonisation was discouraged, the English merchants, who were amassing large fortunes by cod-fishing, not wishing to have to compete with inhabitants of Newfoundland. It was not till 1791 that a Supreme Court of Judiciary was erected in the island. At present there is a Governor appointed by the Crown, a Legislative Council, appointed for life by the Governor in Council, and a Legislative Assembly elected for four years by the whole people. The executive is in the hands of a Ministry having the confidence of the Assembly. For administrative purposes the coast of Labrador is considered as part of the colony of Newfoundland.

FIG. 348.—*Average population of a square mile of Newfoundland.*

The usual means of communication between one place and another has been by boats along the coast, but a railway now crosses the island from St. John's to Port aux Basques, passing through the most fertile and well-wooded districts, and it is expected not only to open much of the interior to settlement, but also to form a part of a line of rapid communication between Europe and America.

Towns.—*St. John's*, so called because the harbour was first entered by John Cabot on St. John's Day, is the capital. It is situated on the east side of Avalon Peninsula, at the head of a magnificent land-locked harbour a mile long and half a mile wide, which is entered through a deep, rocky passage only 200 yards wide at its narrowest part. In it the largest ships can ride in safety. It is the centre of the fishing trade of the island, and may become one of the most important ports on the Atlantic seaboard, when the railway across the island is connected by fast steamers with the Canadian railway system, for it is nearer Europe than any other port in America, being only 1,675 miles from Cape Clear on the west coast of Ireland. *Harbour Grace*, the next town in size, stands on Concepcion Bay.

STATISTICS.

	1891.		1901.
Area of Newfoundland (square miles)	42,200	..	42,200
„ Labrador (square miles)	119,000	..	119,000
Population of Newfoundland	197,934	..	217,037
Density of Population of Newfoundland (per square mile)	4·7	..	5·2
Population of Labrador	4,106	..	3,947
„ St. John's	29,007	..	29,594
„ Harbour Grace	6,466	..	5,184

ANNUAL TRADE (*in pounds sterling*).

	1881–85.		1891–95.
Imports	1,630,000	..	1,400,000
Exports	1,574,000	..	1,350,000

III.—ST. PIERRE AND MIQUELON

BY M. ZIMMERMANN.[1]

St. Pierre and Miquelon.—The two little islands of St. Pierre and Miquelon with a permanent population of a few thousand persons, remain

[1] Translated from the French by the Editor.

in the possession of France as the only relics of the magnificent colonial empire she founded in North America. They lie close to the south of Newfoundland and, small as they are, only 93 square miles, they possess a real importance to the mother country on account of their proximity to the Grand Banks where large fleets of French fishing-boats are engaged in the capture of cod. The islands form the basis of the fish trade with France, and the exports of fish from the port of *St. Pierre*, on the island of the same name, are steadily increasing, their value in 1894 exceeding five million dollars. Miquelon, although the larger island, has very few inhabitants, and the rainy climate with its frequent fogs does not encourage immigration. In connection with these islands France retains certain fishing rights on the west coast of Newfoundland, which on that account is termed the French Shore (Fig. 346).

STATISTICS (1892).

	Area in square miles.	Population.	Density of Population.
St. Pierre	10 ..	5,700 ..	570
Miquelon	83 ..	550 ..	7

IV.—BERMUDA

By the Editor.

Position and General Character.—A solitary bank rising abruptly from the depths of the North Atlantic in 32° N. and 65° W. bears a group of small islands of remarkable formation known as the Bermudas. Farther north than any other coral islands, they are of coral formation ; a consequence of the warm water carried northward by the great oceanic whirl of which the Gulf Stream forms part. The islands occupy a space of only twenty miles by five, but are surrounded, especially on the north and west, by a growing reef through which a few intricate channels admit vessels. Unlike other atolls the Bermudas are in parts hilly, the heights, which rise to 260 feet, being formed of blown coral sand, cemented by the action of rain into solidrock ; they are in fact petrified dunes. The sweeping curve of the hook-shaped main island brings it so close to the smaller members of the group that many of them are reached by bridges or causeways. The situation is as remarkable as the formation. From Bermuda as a centre a radius of 800 miles would sweep the coast of North America from Nova Scotia to Cape Hatteras ; and a radius of 1,000 miles would sweep the east coast of Florida and the whole line of the Antilles from Cuba to Antigua. This gives the little

Fig. 349.—*Bermuda Islands and reefs. The map includes 30 miles by 20.*

group remarkable strategic value. Another element of importance is the climate, which is remarkably mild and equable. The temperature has never been known to fall below 40° ; the monthly mean of February, the coldest month, is nearly 63° ; that of August, the hottest month, does not exceed 80°. Hence in spite of poor soil the islands have become noted for the growth of early vegetables of excellent quality, and for many subtropical products ; the staple crops for export to New York were in 1896, onions, early potatoes, and lily-bulbs. There is no lake nor stream in the islands, and the wells yield somewhat brackish water, so that the inhabitants rely mainly on rain-water caught and stored in cisterns.

History, Government and People.—The group was discovered in 1515 by a Spanish navigator, Bermudez, and from the usual pronunciation of his name it became known as the *Bermoothes*, a form perpetuated by Shakespeare when he laid the scene of "The Tempest" there. In 1609 the shipwreck of Sir George Somers gave them the alternative name of Somers' Islands, and also led directly to the first settlement and colonisation from Virginia and England. Bermuda is now a British colony under a Governor, who is assisted by an Executive and a Legislative Council nominated by him, with an elected Legislative Assembly as a Lower House. Of the population little over one-third is white, the rest being negroes and coloured people as in the West Indies. The main occupation is market gardening, but the increasing use of Bermuda as a winter resort for wealthy Americans is also important. Steamers ply regularly to New York. A telegraph cable connects the islands with Nova Scotia, and may be prolonged southward to the West Indies. Bermuda is an important British naval station for the North American squadron on account of its central position ; the approaches to the channels are accordingly fortified, and a garrison of about 1,500 British troops is permanently stationed in this Malta of the western North Atlantic. The chief town is *Hamilton*, situated on the main island.

STATISTICS.

	1885.		1895.
Area of Bermuda (square miles)	20	..	20
Population	15,036	..	15,794
Density of population per square mile	751	..	789
Population of Hamilton (the capital)	2,100	..	1,296

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"British Association Handbook to Canada." Toronto, 1897.
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The publications of the Canadian Geological Survey contain many valuable reports on exploration in all parts of the Dominion.

CHAPTER XXXIX.—THE UNITED STATES OF AMERICA

By William Morris Davis,
Professor of Physical Geography in Harvard University.

I.—HISTORICAL AND POLITICAL GEOGRAPHY

Discovery and Settlement.—The New World is fortunate in lying with its lesser highlands towards the narrow Atlantic which separates it from western Europe, the home of active and inventive Caucasians, and in presenting its greater highlands to the broad Pacific, which separates it from eastern Asia, the home of the unprogressive Mongolians; for to this accident of position—if such it be—the discovery and colonisation of the New World by the best race of the Old World may be ascribed. A century of discovery along the eastern coast led to a century of colonisation, this to a century of rapid colonial growth, and this again to a century of independence and expansion for the middle colonies of the Atlantic border. At the close of these four centuries the United States has become one of the foremost nations of the world in extent, variety, and value of territory, and in number, intelligence, and wealth of population.

The English colonies of the Atlantic coast between the St. Lawrence and Florida were established at first with relation to the harbours that gave protection to the vessels by which intercourse with the mother country was maintained. From the harbour settlements as centres, large areas of land were claimed under the authority of royal grants; thus the coast was subdivided among a dozen colonies, some of which laid claim to an indefinite extent of inland country. Progress into the interior was in most cases opposed by the aboriginal Americans, of tribal organisation, to whom the name of "Indians" was given by the early discoverers as if to set a lasting mark on their faulty reckoning of longitude. Idealised in romance, too often abused in the rough realities of frontier life, the Indian was a rude savage. He probably lived as closely to his ideas of virtue and duty as the colonists did to theirs, and when fairly treated, as by the Quakers under Penn, he was peaceful; but the ideas of natives and of new-comers were usually unlike, even irreconcilable. Each one often accused the other of injustice, and the intercourse between them was constantly interrupted by petty warfare, resulting in an aggressive advance of the whites into the lands of the Indians. The progress of the backwoodsman among the Alleghenies in the eighteenth century, of the frontiersman on the prairies, plains and mountains, and of the Indian agent, acting for the

government under profitable contracts in the nineteenth century, does not make a glorious history to review, so far as it deals with native tribes.

Hardly less fortunate than the narrowness of the Atlantic is the northward trend of its coast lines, as a result of which the inland progress of the early English colonists, and of the later immigrants from many countries, carried them westward across North America within the limits of a single climatic belt, instead of northward across many. The belt thus naturally marked out includes the greatest area of the best land on the continent. The early boundaries of the belt lay near the St. Lawrence on the north, where the French had planted colonies, and near the Gulf of Mexico on the south, where Florida was colonised by the Spaniards. From these beginnings a great expansion was accomplished in the century of independence; and the new territory, at first in charge of governors appointed at Washington, was gradually, part by part, brought into the fellowship of States, until at present only New Mexico, Arizona, a remnant of Indian Territory, and the remote Alaskan province are still outstanding.

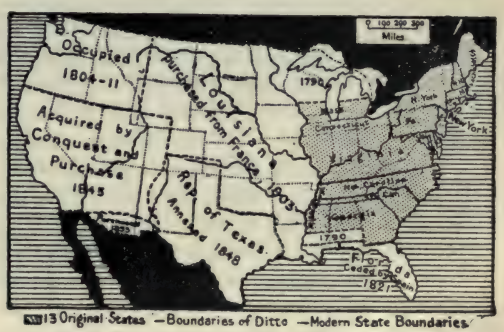

FIG. 350.—*The expansion of the United States.*

The Declaration of Independence on the 4th of July, 1776, was the natural result of unjust legislation on the part of the British government imposing burdens upon the colonies without offering equivalent privileges to them, and Great Britain, was compelled to recognise the independence of the colonies in 1783. Florida was bought from Spain in 1819, Louisiana (the western half of the Mississippi basin) was bought from France in 1803, Oregon was acquired by right of exploration, the south-west from Texas to California was gained from Mexico between 1845 and 1853, after a manner which the Americans had aptly inherited from their ancestors in Europe, and Alaska was bought from Russia in 1867. Finally, Hawaii was annexed, the Philippine Islands and Porto Rico were ceded by Spain, and the protection of Tutuila in Samoa was assumed in 1899.

The States and the United States.—Since the formation of the Union, and particularly since its cementation after the Civil War of 1861–65, the geographer may turn his attention from the single States to the United States, and this is now done even in the descriptive pages of school geographies, the best of which divide the United States into physical districts, and refer to the separate States chiefly as a means of giving location to the physical features and their industrial consequences.

The individual State is still a unit for the politician and the lawyer, but it is a fraction for the geographer, and very often an improper fraction. The Ohio and Mississippi rivers are exceptional in serving as natural boundaries for many States; but even the great Mississippi does not divide States at its head or at its mouth. The Appalachian mountain-system is most irregularly partitioned among the older States. The western States are generally bounded by lines dependent on the form and rotation of the globe, after a method that has become habitual when civilised man wishes to divide thinly settled and unsurveyed territory. The strong front range of the Rocky Mountains, rising abruptly from the plains, forms no State boundary, but is crossed by the borders of Montana, Wyoming, Colorado, and New Mexico. Commerce is free to cross State limits, while the principle of protection regulates the trade of other nations with the United States as a whole. Many manufacturing and mining companies are incorporated in one State where local laws give them some advantage, carry on their business in another State, and perhaps have their financial office in a third. Railroads truly must have charters from every State that they cross; but this is merely a legal technicality, of no consequence to the passengers or the freight that are carried over the tracks. Several lines of transatlantic steamers, nominally bound for New York City, land their passengers in New Jersey; and but for the accident of a State boundary that runs through New York harbour, Jersey City would have probably been included in the Greater New York, recently formed by consolidating several cities with the metropolis. State capitals are often of less importance than the commercial cities, whose growth follows physical controls. Many business men in border cities reside in the adjoining State, and cross the boundary to and from their work every day: Philadelphia has suburbs across the Delaware in New Jersey; St. Louis across the Mississippi in Illinois; and Kansas City itself spreads across the line between Missouri and Kansas.

Government.—The republican form of government adopted by the United States is in many ways paralleled by the governments of the individual States. There is a national constitution, under which each State has its individual constitution. The Union, like the separate States, has the three usual divisions of governmental functions—legislative, executive, and judicial. The President of the whole country has his Cabinet of the heads of departments; the Governor of a State has similar councillors. A Supreme Court sits at Washington, and district federal courts sit in different parts of the country to act upon questions in which the interests of citizens of more than one State are involved. Each State has a similar judiciary for the decision of local matters. The Congress of the United States consists of the Senate

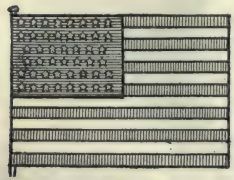

FIG. 351.—*The Flag of the United States—the Stripes representing the 13 original States, and the Stars the present number.*

and the House of Representatives; the Legislatures of the States are similarly divided. The national Senate includes two members from each State—not a satisfactory method of representation to-day, since Nevada (whose population is decreasing), Rhode Island, and Delaware are placed on an equality with New York, Pennsylvania, and Illinois. The representatives are chosen on the basis of population. The laws passed by Congress are uniform for the whole country. Within limits thus defined, the several States frame laws for themselves, often of great diversity in different parts of the country. Many laws regarding slavery formerly obtained in the southern States; liquor laws, restricting or prohibiting the sale of intoxicating liquors, have been passed in several northern States. The right to vote has been extended to women in some of the western States, where conservative traditions have less hold than in the east. With the desire to increase their population, other States have been over-liberal regarding divorce laws; and the desert State of Nevada has even gone to the offensive extreme of permitting prize fights, as if in the vain hope of staying its recent loss of numbers.

People.—The remoteness of the United States from formidable neighbours has fortunately not required the withdrawal of many persons from industrial pursuits into the army and navy; and as long as the territory under the national government remains compact it is probable that the burden of an elaborate, expensive, and unproductive military and naval establishment may be avoided. There is little need for forts and soldiers within the country itself. It is true that individual differences have been too often settled by violence rather than by appeal to the courts; but when the rapidity of settlement and the heterogeneous nature of the population are considered, and when it is remembered that even during the century of independence a large part of the population has had personal experience of the rude conditions of frontier life, the prevalence of good order becomes the striking feature of the country. This must be ascribed chiefly to the plentiful and profitable occupation that the vast extent of new land gave to all comers during nearly all the century of independence; for even with a decennial increase of from five to ten millions there has been land enough and to spare. Another beneficent effect of plentiful occupation has been the rapid assimilation of immigrants, whereby the foreigners from many lands have soon been Americanised. A failure of this process is seen to a greater or less degree in large cities, in certain mining regions, and in some parts of the north-west where the settlement of immigrants, derived largely from a single European country, causes the retention of at least a foreign language if not of other customs foreign to the United States. But in spite of these deficiencies, the leading fact remains that, as a whole, the great population has become naturalised to its new continental home with a success that recalls the spread of thistles in Argentina and rabbits in Australia; and although uncomplimentary, the comparison is based on sound biological principles.

Religious freedom and public education have contributed largely to the good results which plentiful and profitable occupation have chiefly controlled. There is no established church, and the several larger religious bodies are so strong that no one is likely to overpower the others. Illiteracy is rare, except among the negroes and poor whites of the south. Besides the public schools, for which provision is made with constantly increasing liberality, there are State colleges in most of the States, and there are only too many sectarian colleges, especially in the north and east of the plains, established as if for the religious safety of the young of the several denominations. Large gifts have been made to educational institutions by wealthy men; and the strongest universities of the country, Harvard, Yale, Columbia, Princeton, Pennsylvania, Johns Hopkins, Chicago, and Stanford, have thus been supported in great part. Public libraries are numerous; they are frequently the gifts of successful men to the homes of their boyhood. The establishment of scientific Government Bureaus has greatly contributed to the development of the national resources. Notable among these is the Geological Survey, now engaged in mapping the entire national domain; and the liberal method of disposing of its publications at a nominal price, in order that they shall be widely used, deserves imitation elsewhere. The Weather Bureau of the United States is unique in the area covered, and in the promptness of publication of its daily maps.

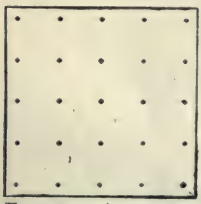

FIG. 352.—*Average population of a square mile of the United States.*

With the aid of education, and the incentive of industrial opportunity, the people of the northern States have been remarkably fertile in mechanical inventions, to say nothing of the application of perverted ingenuity to the development of "rings" in politics and "corners" in the markets, and of monopolies and over-profitable trusts in corporations.

Towards the close of the nineteenth century certain unfavourable reactions followed the rapid growth in population and wealth. Immigrants of a less desirable class than the early comers have made their appearance in increasing numbers, chiefly from eastern and southern Europe. Many of them remain in crowded seaports instead of entering further into the country. Disputes between incorporated employers and the employed have become more and more serious in their nature. The multiplication of factories and the competition among manufacturers compels such economy in production as to reduce wages, and for this reason more than any other, new markets for manufactured products are now eagerly looked for. If the twentieth century witnesses a territorial expansion beyond the present boundaries, the change will be made largely on commercial grounds; for with nearly all the valuable public lands now disposed of to incorporated or to individual owners, and with a rapidly increasing excess of production over consumption, the demand for new

opportunities on the part of the "business men" may prove stronger than the resistance of those conservatives who feel that a republic of widespread territory is not compatible with the Declaration of Independence and the principles of the Constitution. That such a result should have already come within the range of possibility only emphasises the marvellous changes of the United States during the century of independence.

Trade.—The foreign trade of the United States is mainly carried on by the seaports of New York (through which almost one-half of the trade of the country passes), Boston (which comes next with only one-tenth), New Orleans, Baltimore, Philadelphia, and San Francisco. It is carried on mainly under foreign flags, only one-ninth of the value of the export and import trade being done in vessels belonging to the United States. On the other hand, no foreign vessels are allowed to engage in coasting trade from one port of the United States to another. The value of the exports considerably exceeds that of the imports. The former consist mainly of agricultural produce—wheat, animals, preserved meat, &c., from the prairie States, and raw cotton from the south Atlantic and the Gulf coastal plains; these together make up two-thirds of the exports. Manufactures are exported nearly to the value of one-third, most of the products of mines and forests being required for home use. The imports are mainly of products which cannot be produced in the United States, or not in sufficient quantity for the demand, such as coffee, sugar (the largest import, amounting to one-seventh of the value of the whole), raw wool and silk, and certain manufactured goods. The import of such articles as can be manufactured in the United States is discouraged by the imposition of a heavy tariff, which raises the price to the consumer, and so benefits the manufacturing class with less advantage to the farmers. Nearly half of the exports go to the United Kingdom; Germany comes next in importance as a customer, and Canada, France, and Holland follow. The United Kingdom sends one-fifth of the total imports, Germany and France come next with one-fifth between them. The imports are drawn from a wider field than that over which the exports are distributed; thus, while at least 76 per cent. of the exports are sent to Europe, only 55 per cent. of the imports are drawn from that continent. The recent development of the total trade is shown in Fig. 71.

II.—REGIONAL GEOGRAPHY

THE APPALACHIAN BELT

The Appalachian Belt.—The chief geographical features of the eastern United States cannot be appreciated until it is understood that a great part of the region has been uplifted by tectonic forces, worn down to a nearly level surface by erosion, and after being again more or less uplifted is now once more in process of dissection. The Appalachian

Mountains were first formed by disturbances so long ago that once at least in later times the mountains have been worn down to an extensive lowland of moderate relief, close to the level of the sea; and the mountains of to-day are either the occasional unconsumed remnants of the lost ranges, or the product of renewed uplift and dissection. Thus viewed, the Appalachian belt may be easily subdivided and described; thus described, a close connection will be found between its geological history and its present form; and again, between its present form and its control over human conditions.

Divisions of the Appalachian Belt.—An eastern division of the Appalachian belt consists of ancient crystalline rocks, such as schists and gneisses, with many areas of granites and other igneous intrusions. A western division consists of a great series of Palæozoic strata, chiefly derived from the waste of the older rocks on the east, and now greatly tilted and folded. Both of these divisions were well worn down to lowlands over the greater part of their area during Mesozoic time; but the hardest parts of the crystalline division survived in residual mountains, for which the generic name *monadnock* is coming into use, after a fine residual mountain of this name in south-western New Hampshire. The White Mountains of New Hampshire and the Black Mountains and other ranges in North Carolina seem to be groups of such monadnocks.

If viewed in Cretaceous times, the Appalachian region would have been seen as a broad, gently rolling lowland, here and there surmounted by monadnocks, singly or in groups. Since then the lowland has been raised into an upland, bearing the monadnocks on its back. The quiet streams of the lowland were thus revived into new vigour, and new valleys have consequently been incised beneath the upland surface. Unlike the earlier mountain-making disturbances, the later uplift was of a gentle nature, producing a broad swell, whose arch-line follows the Appalachian trend, and whose side slopes fall off slowly to the south-east and north-west. Much of the Appalachian system is therefore not mountainous to-day; near the sea it may even include extensive areas of low land. The broadly uplifted portion has regained the appearance of mountains chiefly by the excavation of valleys along the belts of weak rocks, or along the paths of its larger streams. The mountains and ridges of to-day must therefore be regarded as forms of circumdenudation, like those of the Scottish Highlands, in contrast to mountains of direct uplift, such as occur in certain parts of the western United States.

Following principles of wide application, it may be briefly stated that the valleys worn by the larger streams in the uplifted lowland are now deep where the lowland was raised highest, and shallow where the least uplift occurred. Again, the valleys are broad where the rocks are relatively weak; here, indeed, lowlands of a later generation have been developed, above which the local belts of harder rocks stand as residual hills and ridges of the second order. Where the rocks are resistant the

valleys are still narrow, time enough not yet having elapsed since the uplift to permit the valleys to grow wide. The varied combinations of these controlling factors give rational explanations to a great variety of geographical forms.

The Older Appalachian Belt.—The eastern or crystalline division of the Appalachians—the Older Appalachian Belt, as it may be called (O A in Fig. 353)—consists so largely of resistant rocks that its uplands preserve the altitude given to them by uplift over large areas, and the valleys worn out by the streams are relatively narrow. The western or stratified division—the Newer Appalachian Belt (N A in Fig. 353)—includes a much larger proportion of easily weathered rocks; hence its valleys are well worn down, and its narrow ridges occur only where the harder strata are found. The even crest lines of the ridges, a striking feature of the Newer Appalachians in Pennsylvania, Virginia, and Tennessee, are analogous to the even uplands of the Older Appalachians. The breadth of the older and newer belts is very variable. The older belt is narrow and low between New York and Washington, and broad and high in New England and North Carolina. The newer belt is represented chiefly by a broad valley north of Albany; it is still broader, with many ridges and valleys in Pennsylvania and Virginia.

After thus recognising the division of the Appalachians into two chief longitudinal belts, there are certain contrasts between the northern and southern part of the system that deserve attention. North of New York City, a comparatively recent depression of the Appalachian region, increasing towards Newfoundland, has drowned the borders of this geographical province beneath the waters of the Atlantic, bringing the sea against the resistant rocks of the once deep-seated mountain structures. South of New York, an elevation of the region, increasing towards Alabama, has revealed the unconsolidated deposits of a former sea bottom in the coastal plain of the southern States. Few simpler examples of the manner in which crustal movements determine geographical forms can be found than this, and few in which the arrangement of geographical forms has a more direct influence on the conditions of human life.

The Atlantic Shore Line.—The shore line of the northern Appalachians is extremely irregular; many long arms of the sea enter between low rocky headlands and outlying islands; comparatively deep water is carried into the re-entrants of the coast, making numerous and excellent harbours; but the rugged hill country follows almost immediately inland, discouraging agriculture. Mount Washington, the highest of the White Mountains, and many other monadnocks are in sight from the sea.

The shore line of the southern coastal plain is usually fringed with sand reefs, broken by tidal inlets and enclosing shallow lagoons. The sea is shallow, deepening very gradually towards the outer edge of the continental shelf, where the rapid descent to the true ocean basin begins, a hundred miles or more from shore. The land is very flat, ascending slowly

inland; no hills surmount its surface. It is traversed by rivers whose courses have been extended forward from the former shore line at the inner border of the coastal plain, but the river valleys are eroded only to a very moderate depth; not until the inner border of the plain is approached is the surface so well dissected as to be called hilly. Agriculture is promoted on the more fertile parts of the plain, and upon the deep soils of the smooth uplands of the Older Appalachian Belt, next inland. When it is remembered that the rugged surface of New England was settled by religious refugees, whose convictions were as rugged as the country they peopled, and that the southern States were settled by colonists whose motives were generally commercial rather than religious, a long sequence of historical consequences may be traced from the association of unlike people on unlike lands.

The movements of the land whereby the configuration of the shore line has been effected must be pursued one step further. A slight depression has followed the elevation of the coastal plain from New Jersey to North Carolina; thus the broadened valley floors of the chief rivers have been submerged, forming bays and estuaries, from that of the Delaware to that of Pamlico Sound. On the other hand, a recent movement of elevation has partly counteracted the previous movement of depression in New England, for the littoral districts of Maine and New Hampshire contain smooth plains of marine clays that interlock with the rocky arms of the land.

The order of settlement, the arrangement of State boundaries and the occupation of inhabitants in this region had been profoundly affected by the physical features, thus briefly sketched. The early colonists in tidewater Virginia found protected harbourage in the many branching bays of the Chesapeake and lower Potomac; for many years communication between them was more easily carried on by water than overland through the forests. Although the drowning of these former valley lowlands has been a loss to agriculture, there is some compensation for the loss in the valuable fishing grounds which they afford. Their importance in determining political units is manifest. The largest bays of the coastal plain divided the colonies of Virginia and Maryland. Another bay led to the establishment of Pennsylvania and Delaware, leaving New Jersey on its eastern side. The south-pointing peninsular areas defined by the bays determined the small area of the three colonies that occupied them, in contrast to Virginia and Pennsylvania, which at the time of the Revolution, claimed all the land westward to the Pacific.

The Atlantic Coastal Plain.—Various features of the coastal plain, constantly reflected in the distribution and occupation of the people, may well serve as types for this class of land forms. The outer border of the plain, fronted by shallow water and fringed with sand reefs, from New Jersey to North Carolina, attracts no commercial settlements, but is increasingly frequented as a holiday resort: *Atlantic City* on an off-shore reef in southern New Jersey is the largest town of this kind (Fig. 354). Along

FIG. 353.—*Physical Divisions of the United States.*

the North Carolina shores, the sand reefs, locally known as "banks," have a peculiar concave outline to the sea, meeting in sharp points or cusps, forming Capes Hatteras, Fear, and Look-out. These are believed to be due to the interaction of several large back-set eddies of the long-shore waters, which seem to turn in local circuits between the Gulf Stream and the continent. The cusps are the most perfect examples of such shore forms anywhere known. The "banks" are occupied by small communities of isolated people, known as "bankers." A small breed of horses, known as "banker ponies," here run wild, subsisting on the coarse grass that grows on the sandy soil; in the absence of brooks, the ponies find fresh water by pawing away the sand in the depressions between the dunes.

The islands along the coast of South Carolina are peculiar in being interrupted by numerous tidal inlets, a direct result of the increased strength of the tides in the "Carolina bight" of the Atlantic coast. Here the off-shore islands are not entirely composed of sand reefs, but in part resemble detached portions of the mainland; their soil is rich and produces the famous "Sea Island cotton"; they are exposed to dangerous sea-floods, when on-shore hurricane winds conspire with a rising tide. The tidal waters behind the islands are much reduced in area by the growth of extended marshes, whose inner stretches produce abundant rice crops.

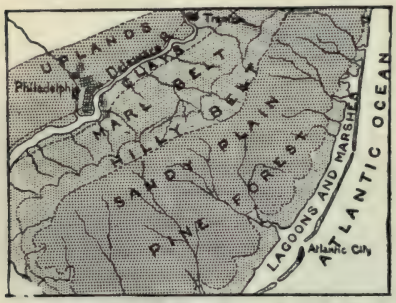

FIG. 354.—*Part of the Atlantic Coastal Plain.*

The important commercial cities of the coastal plain are generally situated on embayed valleys and estuarine rivers; some are near the coast line, like Norfolk, Va., Wilmington, N.C., Charleston, S.C., and Savannah, Ga.; others are at the inner border of the plain like Trenton, N.J., Philadelphia, Pa., Baltimore, Md., Washington, D.C., and Richmond, Va., these cities being at or near the head of tide water. Others, like Raleigh, N.C., and Columbia, S.C., are at the "falls" of their respective rivers, above the reach of tide, but at the head of river navigation; the "falls" being formed where the streams, coming forward from the interior, pass from the resistant rocks of the older land to the unconsolidated strata of the coastal plain. If an observant traveller should traverse the coastal plain along any of the transverse inter-stream strips or "doabs," into which it is divided by the chief rivers, he would find that its soil, the surface expression of its loose textured strata, is arranged in belts that trend nearly parallel to the Atlantic shore line; cleared and farmed where marly or limey, barren and left to pine forests where sandy; the forest, however, yielding large quantities of lumber and resinous products in the southern States. Southern Virginia

and North Carolina include extensive fruit and vegetable farms on the smoother parts of the coastal plain, from which the markets of the northern cities are now largely supplied. Part of the plain near the shore is so low and flat that the growth of vegetation builds up its surface, forming extensive swamps, of which Dismal Swamp, on the borders of Virginia and North Carolina is the largest example. Unlike many other swamps, these occupy the highest ground in their district, and streams run out of them, not into them; where drained and cleared they have been transformed into good farming land.

On passing inland, an increasing diversity of relief is found; the low flat plain near the shore is gradually replaced by a surface in which the valley slopes of the intrenched streams have the appearance of hills; but if our language would permit it, this district should be called a valley rather than a hilly country. The more resistant layers of the plain, generally half cemented sand-stones, sometimes come to surmount the less resistant and more denuded layers further inland, giving a belt-like arrangement in form as well as in soils. Thus a low upland encloses an inner lowland from Newark to Camden, N.J., important as a natural pathway between the chief Atlantic cities and characterised by many pits and potteries on its clayey substratum. Artesian water supply is a marked feature of the outer part of the coastal plain, where its importance increases with the growth of the population, and with the better understanding of the menace to public health in shallow surface wells and polluted streams. The larger shore resorts on the sand reefs are supplied in this way as well as the mainland. Certain towns in peninsular Maryland sink their artesian wells into water-bearing strata or "aquifers," that reach the surface and gather their rainfall west of Chesapeake Bay.

People of the Coastal Plain.—As the southern colonies grew on the coastal plain and the people pressed inland, they found an open country, easily occupied as far as the residual mountains of the Blue Ridge and its fellows in Virginia and North Carolina; but these and the Allegheny Plateau were long-enduring obstacles to the settlement of the further interior. In North Carolina particularly, where the old Appalachians are broadest and most mountainous, movement from east to west was almost forbidden; and to this day an unusually large share of the descendants of the early colonists remain on the coastal plain, on the piedmont slopes, or among the valleys of the inner mountains, with comparatively little gain by immigration from Europe. Nowhere else in the United States is so large a part of the population "native born" and "born of native born." Local habits of speech and home-spun clothing are no rarities in villages among the mountains, which form a fitting geographical environment for conservative ways of life.

New England.—On the New England coast, examples of geographical controls are no less distinct than further south. Here the distinction between upland and lowland depends chiefly on the distribution of strong

and weak rock structures in the Older Appalachian Belt. The strong structures still preserve something of the upland surface gained by the uplift of the worn-down old Appalachians; they are low only near the coast, where they were little uplifted. The weak structures are already worn down to lowlands again. In the present depressed attitude of the region, the stronger structures stand forward in headlands on the coast line, like that of Cape Ann, Mass. *Gloucester*, on a good harbour on this headland, sends out a large fleet of fishing vessels to the Newfoundland Banks: the headland granites are quarried at *Rockport*, and sent away in heavy-laden schooners to more southern ports. The valleys and lowlands are more or less drowned, forming embayments like Boston Harbour; and *Boston* has outstripped the neighbouring settlements of Plymouth and Salem, its rivals in early times, in great part because it stands further inland, and therefore in better connection with the interior population of later growth. In New England many of the towns borrowed names from the mother country; but the chief colony took the name of a monadnock a few miles south of Boston, and now reserved as a metropolitan park, and known to the Indians in colonial days as "Massachusetts" or Great Hills, the first land to rise over the sea horizon on approaching Boston from the east.

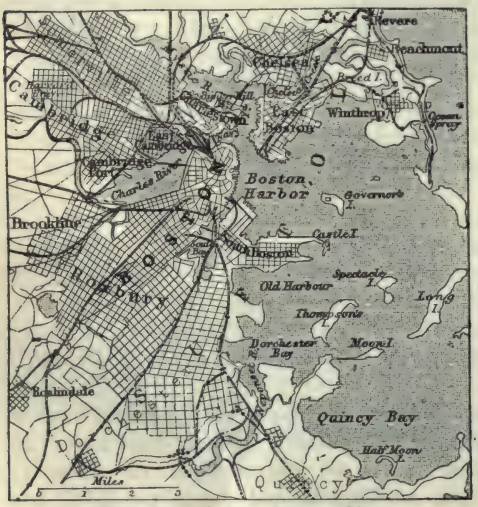

FIG. 355.—*The Site of Boston, Mass.*

The rugged uplands, gradually gaining height inland, were slowly settled, and still offer only hard conditions to their occupants, however well the villages and cities in the valleys may thrive. After a trial of the higher uplands as dwelling places in the eighteenth century, many families moved out west to the prairies in the nineteenth century; towards the close of the latter period, the "hill towns" of western Massachusetts exhibit a very general decrease of population. Here the Old Appalachian Belt is so broad that no river crosses it. Its gain of height (apart from the scattered or grouped monadnocks that rise above it) is so well maintained northward and westward, until reaching a sudden descent from its culmination into the Appalachian valley, that the crest line naturally suggested colonial and international boundaries; thus New York, led inland northward by the Hudson valley, acquired the land west of the Taconic and Green Mountains;

and Canada on the north would have been limited by the divide between the Atlantic waters of Maine and the branches of the St. Lawrence, had not such a boundary lain further north than was expected. Here in the north, the barrier of the Older Appalachian Belt, broad and rugged like that which separated the Carolina colonies from the interior wilderness, divided New England and its Puritan stock from Canada and its French population.

It was to a lowland, etched out beneath the general level of the upland and then partially submerged in Narragansett Bay that Roger Williams and his independent followers removed from the Massachusetts Colony; thus the city of *Providence* and the little Colony of Rhode Island were founded. *Newport*, on an island at the entrance to Narragansett Bay, has become a popular seaside resort on account of its agreeable climate. Parties of settlers around Boston finding themselves crowded, and like an overstocked hive of bees, as a contemporary writer said, ready to swarm, crossed the hilly uplands in 1637, and entered the Connecticut valley lowland, a broad depression worn down on a belt of comparatively weak Triassic sandstones. Some of the towns thus founded remained members of their parent colony; others asked for a new charter, and thus the small colony of Connecticut was formed; it is crowded, like Rhode Island, between its larger neighbours. Its chief cities, *Hartford* and *New Haven*, lie in the lowland that attracted its early settlers.

Further north the uplands are so extensive, the monadnocks are so numerous, and the valleys are often so deep-cut, that the population has grown slowly. Northern Maine is still a forested wilderness; outlying settlements there are to this day called "plantations," in the sense of the word used by the early colonists, and not with the acquired meaning of "an extensive farm," usual in the southern States. Remnants of Indian tribes still remain here. Only the southern part of Maine is well peopled; *Portland* having a fine harbour on the coast; *Augusta*, the capital, and *Bangor*, a great lumber market, being situated at the head of tide on the estuarine waters of the Penobscot and Kennebec rivers. The coastal border is here almost too much dissected by the drowning of its valleys and lowlands; for its village communities are thus isolated to disadvantage on islands and long slender land-arms; local travel in small boats is not always easy on account of the tides, whose strong rise and fall often make landing troublesome, and whose rapid currents frequently overcome oars and sails. In the last thirty years a large "summer population" has resorted to these islands, where the cool water gives the air a mild temperature. Mount Desert, already mentioned, containing a number of summits over a thousand feet in height, the boldest land on the eastern coast of the United States, is the most famous of these summer settlements.

New Hampshire has the advantage of a good harbour at *Portsmouth*, and of a fine river in the Merrimack; but its uplands are thinly peopled, and its mountains are visited only by lumbermen and vacation tourists. Deforestation is already giving cause for alarm here and in Maine, especially

since even the smaller trees are taken to feed the pulp mills, called into being by the many pages of the modern newspaper. The State of Vermont has no seaport and an over-large share of rugged highland. Its industries are rural rather than manufacturing or commercial; its population is increasing slowly.

In all the New England States building stone is an important product. Granite and similar crystalline rocks are quarried extensively, many quarries having the advantage of a situation on or near a navigable tide water. Marble and slate are found in the Green Mountain valleys. Sandstone is taken in large quantities from the Connecticut valley for use in ornamental architecture.

Glacial Action in New England.—The imprint of glacial action is strong in New England. The deep soils of the southern States, gradually passing into firm rock at depths of from thirty to fifty feet, are here replaced by an immediate change from the surface drift, of very variable thickness, to the glaciated surface of firm, unweathered rock. Many ledges on the upland hills have been left almost bare of soil; a thin deposit of drift in the crevices, slightly increased by post-glacial weathering, suffices only to support tree growth. Elsewhere the uplands are blanketed over with unstratified drift or till, a compact deposit of rock scrapings from further north accumulated under the slowly moving ice sheet where more waste was brought than could be carried further forward. The till frequently assumes the form of rounded, oval hills, known as drumlins, half a mile or more long, and from 100 to 300 feet high. These are sometimes so plentifully covered with boulders that they hardly serve even for pastures; but more generally they are cleared and farmed. In certain districts drumlins are so plentiful as to give their pleasing expression to the landscape: southern New Hampshire, and eastern and central Massachusetts contain them in great numbers; the islands of Boston Harbour (Fig. 355) are nearly all drumlins, cliffed by the waves and furnishing drift for the construction of extensive beaches.

In the valleys and on the lower ground near the coast, various forms of washed drift generally bury the ledges out of sight. Extensive terraces occupy the larger valleys; their higher levels are rather too sandy for the best farming land; their lower levels, flooded by the rivers, offer attractive meadows of which none is more beautiful than that of Deerfield, on a branch of the mid-Connecticut, the scene of early settlement and of disastrous struggles with the Indians. It is chiefly in connection with the irregular distribution of the valley drift that the numerous small lakes of New England are to be explained. Their basins were first accounted for by glacial erosion, but at present it is more generally believed that they mark the sites of lingering remnants of the melting ice sheet, while the evacuated space about them was filled with sands and gravels. The lakes form natural reservoirs for the water supply of the villages and cities; the water being pure except in autumn, when, the temperature being

uniform from surface to bottom, overturnings are easily caused by the winds, and the impurities gathered in the deep water during the summer are discharged. Ice from the lakes is an important winter harvest; and at one time Wenham ice, from a small lake near Salem, was famous even in India.

Water Power in New England.—The rivers, entrenching their courses in drift-clogged valleys have repeatedly lost their former channels and cut down upon rocky ledges; thus dividing their courses into smooth-flowing reaches and hurried rapids and falls. The latter supply the great water power of New England, on which its vast manufacturing industries began. *Fall River*, on an eastern branch of Narragansett Bay, was at first satisfied with the power derived from a small stream; now its myriad spindles are driven by steam. The mills here and in *New Bedford*, a little further east, profit from the high humidity of the atmosphere near the sea, an important factor in spinning cotton. The sites of *Lowell*, *Lawrence* and *Manchester* were occupied by farms seventy years ago. Enterprising capitalists and engineers took control of the great water powers of the Merrimack, and to-day the river, supplemented by steam in dry seasons, drives more cotton mill spindles than any other river in the world. Thousands of French Canadians now make their homes in these factory cities, working as operatives in the mills.

In Maine the falls of the Saco gives rise to the paired cities of *Saco* and *Biddeford*; those of the Androscoggin determine the sites of *Lewiston* and *Auburn*. It is noticeable that these manufacturing towns in Maine are near its south-western corner; numerous water-powers in other parts of the State are too remote from the chief markets of the United States to be utilised to their full value at present. In Connecticut, on the other hand, near the great commercial centre of New York City, hardly a single waterfall is idle. Here a certain feature of water-powers of indirect glacial origin deserves notice. In the normal river, the trunk stream has, as a rule, graded its course so as to secure a steady flow; it may even be navigable. Rapids and falls are found only on the upper waters, where the smaller branches, working in districts of greater altitude and frequently on rocks of greater resistance, have not yet been able to wear down their channels to an even slope. Although falls are here abundant, the volume of water is deficient, and the prevailing ruggedness of the head-water hills is disadvantageous to large settlements. But the falls on rivers of drift-terraced valleys are placed at haphazard, as well on the lower trunk stream as near the head, and the glacial period is so recent that even the trunk rivers have not yet extinguished their falls. Manufacturing cities situated at falls near the river mouths have the great advantage of large water volume and of neighbourhood to the sea in a low and comparatively open country; repeated illustrations of the benefits of these favouring circumstances might be named. The lakes are also of practical value as natural reservoirs by which the volume of the lower stream is rendered relatively

constant. Many lakes are dammed at their outlets, and in a dry season the volume of the failing river is maintained by opening the flood gates. In the absence of important agricultural resources, New England has turned so largely to manufacturing that even its abundant water powers do not suffice for its needs. With little or no water power, *Worcester* and *Providence* produce machines and tools. *Lynn* and *Brockton* are "shoe towns." *Waterbury* makes brass ware and clocks, and *Danbury* makes hats. The goods from these active centres find a market, though with increasing competition, in all parts of the country.

Cape Cod and the Outlying Islands.—The most extensive moraines of the New England region are those that mark some of the furthest advances of the ice sheet on the southern coast and on the outlying islands of Long Island, Martha's Vineyard, and Nantucket. A foundation of Cretaceous and Tertiary strata, similar to those of the coastal plain of New Jersey and beyond, but much deformed and denuded before the last ice advance, constitutes the preglacial structures from Long Island to Cape Cod. Belts of morainic hills with numerous boulders increase the relief by a hundred feet or more, giving a pleasing undulation to the surface. Broad plains of washed gravels extend southward from the moraines to the sea, now more or less cut back in the cliffs, as on the east side or "back" of Cape Cod; or fronted with long sand reefs, as along the southern border of Long Island (Fig. 356). In the eighteenth century, when the traveller from Boston to New York went more comfortably by sailing packet than by land, even the outermost island of Nantucket was not the out-of-the-way place that it is to-day; and for some time after overland travel was established a thrifty Quaker stock and an active whaling industry made the island prosperous; but when whales became scarce and when rock-oil replaced whale-oil, the trade and population of *Nantucket* dwindled, its wharves decayed, some of its houses were carried away to the mainland, and it was almost in danger of being deserted, until in recent years when its value as a quiet summer resort was recognised. *Provincetown*, a land's end village on Cape Cod, is peculiar in containing a colony of Portuguese, the families of fishermen and sailors. Here on a great wave-built spit, covered with sand dunes, the Pilgrims first landed; but seeing the morainic hills of Manomet across Cape Cod Bay, they sailed on and founded Plymouth, where the famous rock on its shore is only a glacier boulder of modest size, too small to be chipped off for keepsakes by the many descendants of the Pilgrims.

Gateways to the Interior.—The narrowing of the Older Appalachian belt between New York City and Washington, due to ancient subsidence of a part of the ranges, has been of great importance in determining points of entrance of immigration towards the vast Mississippi basin; for nearly all the many thousand emigrants from Europe have reached the interior by gateways through this least formidable part of the mountains. There can be little doubt that the important commercial cities of New York,

Philadelphia, and Baltimore owe their growth to the easier access thus allowed to the interior of the country behind them. Ports like Providence, Boston, Salem and Portland, further north, and ports like Norfolk, Wilmington, Charleston and Savannah, further south, chiefly serve local needs; they cannot compete in international traffic with the three intermediate cities, of which Boston and Norfolk are the only important rivals. The pre-eminence of New York among the middle ports is dependent partly on its good harbour, partly on being nearer Europe than the ports further south, and much more on the navigable waters of the Hudson that reach inland almost across the Appalachian Belt.

The Newer Appalachian Belt.—The last point may be better appreciated after a fuller account of the Newer Appalachian Belt (N A in Fig. 353), whose inter-ridge lowlands are worn down on the weaker Palæozoic strata. They extend from the Gulf of St. Lawrence (beyond the territory of the United States) along a curved path past New York to Alabama, and there disappear under the overlapping strata of the Gulf coastal plain. In the north the newer belt is limited on the inland side by the Laurentian plateau of Canada, and by an outlying area of similar structure and more rugged form, known as the Adirondack Mountains, in northern New York. From Albany to Alabama, the inland boundary of the ridge-and-valley belt is formed by the escarpment of the Allegheny plateau. In New York the ridges are few and the lowland is broad and open, but from New Jersey to Alabama, long, narrow, even-crested mountains of curious zigzag pattern, 1,000 to 3,000 feet high, formed on the outcropping edges of resistant sandstone layers, are very numerous. They divide the lowlands into many compartments, with difficulty connected by roads over the mountains, but open to one another where rivers have cut transverse notches or water gaps. The ridges are highest in Virginia, where some of the crests rise to 4,000 feet; and here most of the valleys between them are so narrow and deep as to be of small value for settlement. Much of the better timber has been cut from the ridges, but they are still left to forest growth, for their slopes are cloaked with coarse, slow-creeping blocks of sandstone, the waste of the ridge-making strata.

The valley floors between the ridges are sometimes underlain by limestone, especially along the eastern border of the Newer Appalachian Belt; here the rich soils are occupied by some of the best farms in the country, albeit they have not the unlimited expanse of those on the western prairie. *Harrisburg*, the capital of Pennsylvania is in the midst of these thrifty surroundings. Beds of anthracite coal and plentiful deposits of iron ores among the ridges of Pennsylvania have contributed greatly to the wealth the Keystone State—so called from being the middle one of the thirteen colonies in the time of the Revolution. Mining industries have here attracted colonies of European labourers, where foreign languages are often more prevalent than English. The iron ores of the southern part of the belt, near the coal-fields of the plateau on the west, have been an

important factor in the development of the "New South" since the Civil War; the centre of the iron industry in Alabama having ambitiously taken the name of *Birmingham*.

The continuity of lowland along the eastern side of the Newer Appalachian Belt has given this part of its floor the general name of the Great Appalachian Valley; it is locally known as the Hudson Valley in New York, the Kittatinny Valley in New Jersey, the Cumberland Valley in southern Pennsylvania, the Shenandoah Valley in Virginia, and the Valley of East Tennessee. The Great Valley is peculiar in being drained by a number of independent rivers that find exit through the deep gorges cut in the uplands on the east or west. Exceptions to this rule are seen in the longitudinal escape of the St. Lawrence with its branch from Lake Champlain in the north-east, and of the Coosa in the south-west; both of these rivers run out lengthwise at the extremities of the valley. The Hudson, Delaware, Schuylkill, Susquehanna, Potomac and James all rise in the valley, or on the plateau to the west of it, and reach the Atlantic through steep-sided, narrow gorges in the uplands of the Older Appalachian Belt. The New-Kanawha and the Tennessee rise in the Older Appalachians of North Carolina, and escape westward through deep gorges in the Allegheny plateau to the Mississippi system and the Gulf. It is interesting to note that the six Atlantic rivers all cross the Old Appalachian Belt in or near its low and narrow middle part; their valleys serving as so many entrances to the interior, and thus emphasising the contrast already noted between the lower middle and the higher terminal districts of the Atlantic highlands.

Transverse Valleys in the Old Appalachian Belt.—The physical relation between the lengthwise lowlands of the Great Valley and the transverse gorges by which its rivers escape has been generally misunderstood. The broad lowland and the narrow gorges are the work of erosion in the same period of Tertiary time. The rivers had much the same pattern as to-day when all this region had about the altitude of its uplands and ridge crest. Since then the excavation of the broad inner valley and the incision of the narrow gorges have gone on together: indeed, the incision of the gorges on the transverse course of the several rivers in the harder rocks of the Older Appalachian Belt was the essential antecedent to the deepening of their channels in the weaker rocks of the newer belt; but while the gorges have widened very slowly in the harder rocks, the weaker strata of the inner belt have, as it were, melted away under the weather, and the inner valley has become as broad as the belt of weak strata that guide it. Since the general form thus described was developed, a moderate uplift of the region has again set the rivers at work, and they have cut narrow trenches in the valley floors.

The Hudson and St. Lawrence are unlike all the other rivers of the Great Valley in having their valleys partly flooded by sea water, in consequence of the moderate depression of the northern lands already mentioned in describing the bays of the New England coast. The lower St.

Lawrence is thus broadly expanded into a funnel-shaped bay, misnamed a gulf ; but the drowned Hudson is closely hemmed in by the steep walls of the highlands. It thus retains the appearance of a river, although its volume is by no means an appropriate measure of the rainfall on its basin. It is a deep navigable waterway, open to large vessels to the head of tide at Albany and Troy, 150 miles from New York. It is the only deep-water passage through the Atlantic highlands ; and on this fact chiefly depends the metropolitan rank of New York City among the Atlantic seaports. The northward extension of New York Colony and State, from its first settle-

Orange
Irvington
Harrison
Kearny
Hudson
Newark
Elizabeth
Union
Jersey City
Hoboken
Weehawken
Guttenberg
North Bergen
Secaucus
Bayonne
Richmond
Richmond Hill
Middle Town
New Dorp
South Field
Westfield
Woodrow
Gifford's
Bentley
Great Kills
Pleasant Plains
Tottenville
Staten Island
New York Bay
Arthur Kill
Kill Van Kull
Newark Bay
Hackensack R.
Passaic R.
Harlem R.
East R.
Long Island
New York
Astoria
Long Island City
Flushing
Bay Side
Whitestone
Great Neck
Little Neck
Douglaston
Manhasset Bay
Port Washington
Roslyn
Glen Cove
Hempstead
Jamaica
Jamaica Bay
Rockaway Beach
Rockaway Inlet
Rockaway Point
Coney Island
Brighton Beach
Manhattan Beach
Sheepshead Bay
Flatbush
Flatlands
Gravesend
Gravesend Bay
Brooklyn
Williamsburg
Bushwick
Ridgewood
Maspeth
Newtown
Woodhaven
Richmond Hill
Kew Gardens
Forest Hills
Corona
Flushing Bay
Flushing Creek
Bowne
Whitestone
Throgs Neck
Fort Totten
Fort Schuyler
Fort Wadsworth
Fort Hamilton
Fort Lafayette
Fort Tompkins
Fort Richmond
Fort Hancock
Fort Lee
Fort Washington
Fort Morris
Fort Slocum
Fort Wood
Fort Jay
Fort Columbus
Governor's I.
Ellis I.
Liberty I.
Bedloe's I.
Robbin's Reef L.
Romer Shoal L.
Swinburne I.
Shooter's I.
Prince's Bay
Lemon Creek
Mariner's Harbor
Port Richmond
Elm Park
Clifton
Port Richmond
Port Ivory
Port Reading
Port Johnson
Port Elizabeth
Port Newark
Port Jersey
Port Liberty
Port Morris
Port Chester
Port Washington
Port Jefferson
Port Jervis
Port Orange
Port Clinton
Port Richmond
Port Richmond
Port Richmond

branch valley comparable to that of the Mohawk, by which, as will be shown further on, New York City has so greatly benefited.

New York, Philadelphia and Baltimore.—The relation of *New York City* to the interior of the United States has determined its relation to Europe. Commercialism is here supreme. The banker, the broker, the importer, and the railway director are the leaders of business activity. Standing as the chief port of entry for commerce and immigration, the city has gathered colonies of all the peoples of Europe. Germans, French, Italians, and many other nationalities here group themselves together, preserving their foreign ways even to the second generation; much concern is felt by the sociologist over so congested a population. The government of the city is one of the most difficult of political problems, and it has by no means been made easier by the recent consolidation of Brooklyn and other independent municipalities in "Greater New York." The professional politician and the "boss" accomplish their selfish ends by most elaborate and successful management of the people. The narrow island between North (Hudson) and East rivers has become inconveniently crowded; elevated railroads, running to the northern suburbs, make the streets resound with their many trains, although the New Yorkers seem to accept the noise as a proper part of the bustle of their great city. A huge suspension bridge connecting New York and Brooklyn very imperfectly accommodates the crowds that throng it morning and evening.

Philadelphia has been favoured in another manner. It began with the thrift of the Quaker followers of William Penn; it has profited from the presence of many industrious German immigrants on the rich farming lands of the Great Valley, near at hand; it has had a commercial advantage in being the southernmost Atlantic port in the non-slaveholding States. Furthermore it has had great physical advantage from abundant open ground on which to expand, so that the proportion of houses to families is very large; from the water power of the Schuylkill, whereby it has come to be a great manufacturing city; and from the small altitude and width of the Older Appalachian Belt in the background, so that the communication with

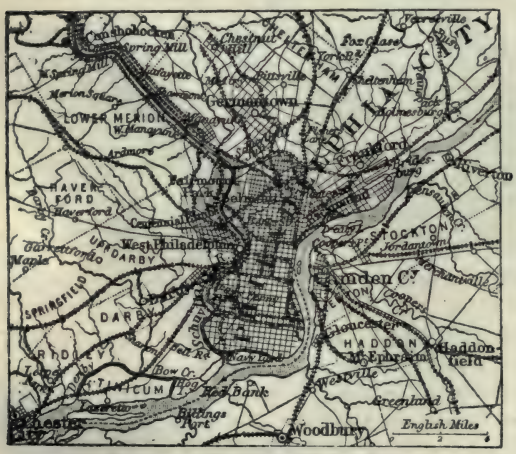

FIG. 357.—*The Site of Philadelphia.*

the interior of Pennsylvania has been comparatively easy. The uplands are narrow here because of the strong overlap of the coastal plain. They are low, because they have been but little uplifted since they were worn down in Cretaceous times ; but more than this, they happen here to include a tract of weak Triassic sandstones and shales (like those of the Connecticut valley and the Bay of Fundy), which occupies a large part of their small breadth, and indeed obliquely traverses them from east to west. The sandstones and shales are now worn down to a lowland, like the Great Valley next adjoining on the west. Nowhere else are the Older Appalachians so inconspicuous as here. Indeed, if traced by the empirical guide of height instead of by their geological composition and their physical characteristics, they might be overlooked, as has often happened in geographical descriptions. Extensive railroad systems connect Philadelphia with the coal-fields of Pennsylvania, and with the Ohio Valley ; but so great is the importance of New York, that all these roads now continue their trains past Philadelphia to the metropolitan city (see Fig. 336).

Baltimore is practically the civic representative of Maryland. In contrast to Philadelphia, it is the northernmost commercial city of the south. It is physically the result of the far inland reach of Chesapeake Bay, and of the access to the further interior afforded by the valleys of the Potomac and Susquehanna rivers. The bay brings in ocean-going vessels and develops international trade, as well as supporting an active fishing industry ; oysters being included under fisheries on commercial rather than zoological grounds. The Potomac valley leads a great railroad from the harbour city towards the Ohio region ; but the difficulties encountered in crossing the Allegheny Plateau and the comparatively small population on the way, have made this line less successful financially than the chief railroads further north. Educationally, Baltimore has in Johns Hopkins, the southernmost university of wide resort, as Boston has (in its suburb of Cambridge) Harvard, the northernmost great university ; the latter is an outgrowth of an early colonial beginning in 1636.

FIG. 358.—*Washington and the District of Columbia*

It is noteworthy that the three great commercial cities just described are not the capitals of their States. The State governments have their seats in Albany on the Hudson, Harrisburg on the Susquehanna, and Annapolis on Chesapeake Bay. *Washington*, whose situation on the lower drowned Potomac corresponds

to that of Baltimore on Chesapeake Bay, is purely a governmental city. The great water power of the Potomac, where it runs from the Old Appalachian Belt to the Coastal Plain, is not yet utilised for manufactures.

THE ALLEGHENY PLATEAU

The Allegheny Plateau (A P in Fig. 353) is the westernmost division of the Atlantic highlands. It retains much of the forest which originally covered nearly all the region east of the Mississippi and south of the Ohio. Its altitude ranges from 2,000 to 4,000 feet. It extends as far south-west as the mountain belt, and like it disappears under the coastal plain of the Gulf. It is terminated on the east by a strong escarpment, known as Allegheny or Cumberland Mountain in different parts of its front; but on the west or north-west it as a rule decreases in height gradually, and thus merges into the prairie region of the Ohio basin. On the north-east, the plateau is known as the Catskill Mountains, overlooking the Hudson and Mohawk valleys. Throughout this extensive region, the same great series of Palæozoic strata that is broken, tilted, and folded in the mountains of the Newer Appalachian Belt, lies nearly horizontal. Productive coal-beds underlie most of the surface. The well defined north-east and south-west trends that prevail in the uplands, ridges and valleys of the Appalachians, are here exchanged for a systemless maze of digitate spurs dissected by repeatedly branching valleys. The greater part of the region is drained by branches of the Ohio, of which the most interesting is the Kanawha, whose canyon, 1,000 to 1,500 feet deep, is the strongest river valley in the eastern part of the country. The Kanawha is furthermore remarkable in having maintained its course to the Ohio against an arching uplift of the plateau in late geological times, whereby the district traversed by its middle waters was elevated about 1,000 feet more than that about its upper waters; but in spite of this discouragement, the river cut down its channel and held to its former path; thus acquiring a right to membership in the interesting class of antecedent rivers. There is not another river in the whole Appalachian region that so well preserves its ancient course.

The Southern Plateau.—Beginning on the south-west, as it emerges from the southern coastal plain, the features of the Southern Plateau may be called coarse-textured, inasmuch as tablelands that measure several miles across rise between broad-floored valleys. Here the uplands are known as the Cumberland Plateau or Tableland, for the most part a forested wilderness. Although containing great stores of coal, there has been little mining until within recent years, in the return of prosperity to the southern States after the civil war. The plateau is peculiar in falling off on the north-west by an escarpment almost as strong, but much less straight than that by which it is limited on the south-east. The surface thus descends as if by a great step to a platform of less elevation, underlain by limestones; here occur the numerous caverns of Tennessee and Kentucky, of which the Mammoth cave is the most famous. Further to the north-west the platform

is underlain by sandstone, furnishing an infertile soil, and discouraging an impoverished population, in remarkable contrast with the fortunate occupants of the limestone lowlands next beyond, the famous Blue Grass country of Kentucky and the less known but equally fertile Nashville basin of Tennessee (B G and N in Fig. 353). Looking back from the extensive farms of the limestone lowlands, one sees a wooded bluff, several hundred feet in height, known as the Highland Rim. It was from a point on that part of the rim known as Muldraughs hill that Daniel Boone, late in the eighteenth century, first saw the beautiful lowland that his followers settled, and thus founded what afterwards came to be the State of Kentucky.

The Middle Plateau.—The middle part of the plateau, in eastern Kentucky and West Virginia, reaches altitudes of 3,000 and 4,000 feet, so that its dissected uplands fully deserve the name of mountains, by which they are locally known; and the people appropriately call themselves "mountaineers." As in Tennessee, the region is a great forested wilderness. The separate uplands are seldom broad enough to support more than a small community; often not more than a single family, who find life hard and lonesome. Farming is unprofitable, for most of the surface consists of steep hillside slopes, belted around with contouring sandstone ledges; if the forest were cleared and the ground ploughed, much of the soil would soon be washed away. Roads are rough and steep, badly washed by heavy rains; to keep them in good condition would cost large sums of money, far beyond the means of the county treasuries. The valleys are deep, and their narrow floors are exposed to destructive floods that rise suddenly in wet weather. Bridges are an expensive luxury that only the more important highways can maintain: when streams cannot be forded in time of high water, travel is for a time suspended. The railroad that follows the deep canyon of the Kanawha through the plateau brings the lower lands on the east and west into close connection, but it has little effect on the people among the hills. Even the branch lines that carry out coal and lumber leave the greater part of the plateau country untouched and untamed. The people still live in primitive log houses; hand looms are no rarities; wild game is almost as important a food supply as garden produce; the rifle is as familiar as the spade. Feuds are kept up for years between rival families, and personal differences are settled by an appeal to arms rather than to the courts.

The Northern Plateau.—A less altitude prevails in the plateau within the limits of Pennsylvania, where 2,000 feet will measure most of the upland heights. Here a greater degree of settlement has accompanied the fuller development of the great natural resources of the region, both of these advances being promoted by the neighbourhood of the great manufacturing communities, at first in the north-east, and afterwards in the north-west as well, where a ready market is found for the bituminous coal, the rock oil or petroleum, and the lumber of the plateau. Railroads are nume-

rous and monopolistic corporations dominate the politics of the State. *Pittsburg* has attained an altogether unusual population for a city in the plateau district; it was favoured at first by its situation at the junction of the head branches (Allegheny and Monongahela) of the Ohio, down whose ample current so many early settlers of the western prairies found easy transportation; later by the marvellous development of industries and railroads in the second half of the nineteenth century. It is now one of the greatest manufacturing centres in the United States; the ironworks in and near the city are the admiration of the technical world.

The north-east extremity of the plateau, known as the Catskill Mountains, contains summits as high as those of West Virginia. No mineral products of value, other than too abundant building stone, are found here; hence the mountains remain thinly populated, and are chiefly noted as a summer resort for the crowded population of New York City. Further west, along the southern borders of New York State, the plateau is less elevated, and its rolling uplands and open valleys contain an agricultural population. It happens that this portion of the plateau contains no coal, and comparatively little rock oil; the productive fields being almost entirely south of the Pennsylvania boundary.

Outliers of the Laurentian Highlands.—The rugged Adirondack Mountains of northern New York, and the highlands of northern Wisconsin and Michigan are outlying representatives of the Laurentian highlands of Canada. They consist of extremely ancient rocks, for the most part thoroughly indurated and very resistant. Although their structures are greatly disordered, their relief is of moderate measure; in the Adirondacks, the highest summit, Mount Marcy, is but little more than 5,000 feet above sea-level, with valleys one or two thousand feet deep around it; in northern Wisconsin, the altitude of the highlands is not so great, and their local dissection is much more gentle. Both of these are forested wildernesses, unattractive to the farmer, but tempting to the lumberman. The ancient rocks contain valuable stores of iron ore, less important in the Adirondacks than in upper Michigan, where they are extensively mined and shipped down the Lakes to furnaces near the coal regions. The uplands bordering on Lake Superior are peculiar in containing deposits of native copper, unknown elsewhere in the world. The Adirondacks are separated from the Laurentian region by an ancient trough that has been filled with Palæozoic rock layers and re-excavated in comparatively modern geological times. It is followed by the St. Lawence river, an important waterway, but so young on its present course that in spite of its great volume, many rapids still interrupt its channel. The Wisconsin-Michigan uplands (O L in Fig. 353), are separated from the Laurentian plateau in Canada by the broad and deep trough of Lake Superior of uncertain origin, but of great value as a member of the vast system of inland waterways by which the wheat of the north-west, the ores of the uplands, and the lumber from the forests are carried to the

more populous States. The outlet of Lake Superior is interrupted by rapids; hence its name, the Sault (pronounced *Soo*) Ste. Marie. These are passed by a canal that has been constructed around them on the southern side (see Fig. 344); the tonnage passing through this canal rivals in quantity, although not in value, that of the Suez canal.

The Adirondack region, and to a less degree the highlands of Wisconsin also, serve as camping and hunting grounds in the summer vacation season, when civilised man seems to enjoy a temporary return to the wilder ways of his remote ancestors.

THE OHIO REGIONS AND PRAIRIES

The Ohio Region.—The region north of the Ohio and east of the Mississippi is one of the most valuable parts of the United States. The surface is of moderate relief, nearly everywhere open to occupation. The soil is rich, the climate encouraging. Into this magnificent territory has poured a tide of immigration during the nineteenth century with which the history of the world has no parallel. The struggles for the acquisition of the land were practically completed before the century opened; struggles in which the stronger invaders repeated too often the harsh treatment that a higher race inflicts upon a lower, but which nevertheless lead forward to progress in the end. The northern Atlantic States, as well as the countries of north-west Europe, furnished hundreds of thousands of able-bodied workers under whose hands the Ohio basin region has grown to marvellous productiveness, activity, and wealth, fully warranting the opinion of Lewis Evans of Philadelphia in 1750, when he urged Great Britain to gain possession of this "great extent of good land in a happy climate," arguing that whatever nation wins it must inevitably gain the balance of power on the continent.

The Ohio Region as an Ancient Coastal Plain.—The physical features of the Ohio region are best explained by regarding it as an ancient coastal plain, skirting the older Laurentian lands of Canada and their outliers in the Adirondacks and the Wisconsin highlands. Travelling southward from the rugged Laurentian highlands of Canada on the meridian of Niagara, a traveller would see the rugged country merge into the fertile lowland of Ontario, partly submerged under the lake of that name; all this low ground being an "inner lowland" worn down on the weak under layers of the ancient coastal plain. Crossing to Niagara, the ascent of a bluff or escarpment of strong limestone, two or three hundred feet in height, makes a distinct break in the general smoothness of the lowland and leads to a broad upland, which then gradually slopes southward to the trough of Lake Erie, a second lowland underlain by weak strata, and in turn enclosed by the hills that form the northern border of the Allegheny plateau. Thus two inner lowlands and two uplands form belts along the border of the Laurentian country; and the rest of the Ohio region may be described in terms of these elementary forms.

The Mohawk Valley.—Following the fading Niagara escarpment eastward beyond its disappearance near Rochester, one sees the two lowlands of Ontario and Erie blend into one, forming the rich farming country of western New York; then narrowing as the Adirondacks come forward from Canada and thus define the Mohawk valley between their southern slope and the escarpment of the Helderbergs, which here forms the northeastern extremity of the Allegheny plateau. It is the confluence of the Mohawk valley with the navigable tidewater of the Hudson that opened the Great West to the port of New York City. At first an Indian trail, then the path of the frontier settlers driving their waggons up the valley road, next the course of the famous Erie canal whose construction in the first half of the nineteenth century was a fit achievement for the Empire State, now followed by important railroad lines, the Mohawk valley was always a leading line of movement between the east and west. There can be little question that the port that stands in closest connection with its eastern end shall long be pre-eminent on the Atlantic coast. It is true that Philadelphia stands nearer the Ohio region, and that the great railway leading thence to Pittsburg and beyond has the advantage of least distance; but its way leads over the Allegheny plateau where gradients are heavy. It is true that a shorter railway has been constructed from New York to Buffalo than that which follows up the Hudson and the Mohawk; but the shorter line crosses the Allegheny plateau where it is broader than in Pennsylvania, and it has had to pay dearly for its defiance of natural pathways; indeed, had English investors known more of the form of the land when this venturesome road was projected, they would not have become so largely its owners. *Binghampton* and *Elmira* are the only considerable cities on its way among the hills; while the Hudson valley, the Mohawk valley, and the southern border of the Ontario lowland include a much greater population in *Newburgh, Poughkeepsie, Albany, Troy, Schenectady, Utica, Syracuse, Auburn* and *Rochester.*

The Great Lakes and the Prairies.—In tracing the Ohio region westward, it is interesting to note the relation of its belted lowlands and uplands to the basins of the Great Lakes and to the path of the international boundary. The northern border belts of the Ohio region are neither straight nor persistent; they vary greatly from the type section on the Niagara meridian. The basins of the Great Lakes exhibit a close relation to the lowland belts. Ontario, Georgian Bay and Green Bay (on the west side of Lake Michigan) occupy depressed parts of the inner lowland; Erie, Huron and Michigan occupy corresponding parts of the second lowland. Between the lakes, the lowlands offer excellent farming districts. The upland of the Niagara limestone, between the two lowland belts, with its bluff looking across the inner lowland towards the rugged old Laurentian land, may be traced with varying strength even beyond the Mississippi; it is of moderate height, and is not rugged enough to discourage settlement. Its course (N on Fig. 353) leads north-west across

the Province of Ontario to the belt of islands that divides Georgian Bay and Lake Huron ; westward through the eastern arm of upper Michigan State ; southward through eastern Wisconsin in the ridge that divides Green Bay from Lake Michigan ; and then curves through northern Illinois into north-eastern Iowa. Artesian wells afford an abundant water supply in this ancient coastal plain south of the Wisconsin highlands. The Allegheny upland, bounding the lowlands in southern New York, fades away westward in Ohio ; an isolated upland, coal-bearing and forested like the Allegheny plateau, but subdued in form, occupies lower Michigan between Lakes Huron and Michigan. The lumber from this region has led to the growth of the city of *Grand Rapids*, where household furniture is largely made.

It is but natural that the international boundary should have followed the manifest line of the lakes and rivers, rather than the more irregular and less distinct line that marks the inner border of the ancient coastal plain ; and if by thus departing from one physical guide for another the United States have lost peninsular Ontario, they have gained the great mineral deposits of the upper Michigan highlands. It should be remarked that Lake Superior is unlike the other lakes in being unrelated to the belts of the ancient coastal plain. Its basin is an anomaly, a puzzle to the geomorphologist, who has not yet been able to give a good account of it. The basin must be of recent origin, for if ancient, it would long ago have been filled with sediments and converted into a plain.

The hills of the Allegheny plateau are not seen in Ohio west of Cleveland ; and with their disappearance a broad expanse of country opens towards the Mississippi, originally wooded in the east, a treeless prairie further west. This great extension of the Erie lowland is now divided into the States of Ohio, Indiana and Illinois. Little wonder that the early farmers of the rugged New England hills sent their sons out to this wonderful farming land of deep and rich soil. Little wonder that such of the European immigrants as did not stop in the Atlantic cities passed the uplands of the Allegheny plateau before settling upon their new homes. Little wonder that those who found so bountiful a welcome on the prairies, became Americanised in the first generation ; never has so composite a population been so rapidly unified. With free movement, with rapidly growing population, with wonderful increase in wealth, one here sees few of the old-fashioned ways of living that still remain in the enclosed valleys of the Atlantic highlands. The rough cabin or log house was usually replaced by a well-built frame cottage within the life of the first settler ; and his sons and grandsons, leaders in the growing communities, often occupy mansions of some pretension, albeit their architecture seldom follows classic lines.

The rivers at first served as important lines of travel and transportation. The growth of *Cincinnati* was for many years as much dependent on the trade that followed the Ohio river as on the rich farming country that

surrounded it. Canals were cut between the headwater branches of the Ohio and Mississippi and the waters of the Great Lakes; the lakes themselves, consecrated to peace after the war of 1812, lie with extended shore lines along the northern border of the great fertile country, and a whole series of important cities has been built on their southern side—Buffalo, Erie, Cleveland, Toledo, Detroit, Chicago, Milwaukee. But important as the rivers have been and as the lakes are still, it is to the marvellous development of railroads on the level prairies that the industrial and commercial activity of the region is most largely due. Distance is their only obstacle, and that they overcome by building single tracks; they have few cuttings or embankments, they cross each other on the level, and gather in tangled ganglia in many prairie centres like Columbus, Indianapolis, and Springfield. An open country, occupied by a few Indians a century ago, has suddenly become populous and rich, and the manufacturer and the railroad magnate take the place of the feudal baron of Europe.

Glacial action in the Ohio region.—Various geographical features have already been traced backward to their origin in past geological processes, and forward to their control over human distribution and occupations. This phase of geographical study nowhere receives more striking illustration than in those elements of form that have resulted directly or indirectly from the action of the ice sheets of the glacial period. It has been too generally the custom to set such subjects aside, as if they belonged only in the province of the geologist; but in the Ohio region as in New England events without number, great and small, from trifling matters of individual action to momentous problems of national importance, have turned on the geographical results of ice action. Once recognised, their meaning cannot be neglected. The soils on which the richness of the Ohio region depends are almost wholly of glacial origin. Smooth sheets of till were spread out under the invading ice sheet where it could drag along no further the rock waste that it brought from nearer its source; still smoother sheets of silt were deposited in various marginal lakes, large and small. Sheets of loess, ascribed to wind action by many observers, to turbid fluviatile waters by others, are found in the southwestern part of the district, and reappear in greater force beyond the Mississippi. Far from being a destructive agency, the ice sheets and their associated processes were here largely constructive; they buried the preexistent topography, extinguished the pre-glacial drainage, and made the surface over anew. The soil of the till plains is more or less stony; that of the silt and loess plains is almost impalpably fine. All are rich soils, for they consist in greatest part of pulverised rock, not exhausted by vegetable growth while weathering, but worn mechanically from its parent ledges under the desert ice sheets and in the ice-fed rivers.

The plains of till, silt, and loess are so extensive and continuous, that rock ledges are unknown for many miles together; pre-glacial hills and valleys are completely buried over large areas; it is only in the sides of

young valleys, recently cut through the glacial deposits, that the ledges are exposed. The geologist hardly knows where to draw the boundaries of rock formations; he has to trust largely to the samples brought up from the wells and deep borings that have been made in search of oil and gas. The absence of trees on the prairies has been ascribed by some to the fineness of the soil; by others, to Indian fires. It appears probable that both these causes have had effect. The climate of the region is certainly favourable, for trees flourish when planted. On the other hand, trees are absent from the western plains because of lack of rainfall; and the blending of plain and prairie west of the Mississippi has sometimes given rise to the wrong idea that their treelessness was due to a common cause.

It may now be understood how strikingly the soil and the surface of the prairies north of the Ohio differ from those further south, as in the Blue Grass region of Kentucky. There the soil is of local origin and varies with the nature of the rock beneath; hence the sharp contrast between the fertility of the Blue Grass district and the barrenness of the adjoining sandstone uplands already mentioned. In the glaciated region, local and distant materials are well mixed; there is generally an excess of local material, but it seldom prevails in such quantity as to make the soil very much better or worse than the average. The hills of south-eastern Ohio, outside of the glaciated district, should be regarded as a part of the dissected Allegheny plateau; but whatever hills there once were in north-western Ohio are now buried under the drift. One part of the State has many coal mines, the other has extensive farms. In the same way southern Indiana and Illinois, beyond the border of the drift, exhibit local details of topographic form dependent on rock structure, and accompanied by relatively sudden changes in the character and value of the soils, similar to those found south of the Ohio river in Kentucky; the central and northern parts of these States are smoothly drift covered for scores of miles.

Corn (Indian corn, or maize) is the characteristic crop of the drift region from Ohio to Nebraska. Its growth is favoured by hot summer weather. Travelling by rail, one may pass miles and scores of miles of corn-fields, waving green in early summer, dull brown or gray in early autumn. Other grains are also raised in abundance. Great herds of cattle are pastured on the drift prairies, rivalling the product of the western plains. Roads very generally follow the north-and-south or east-and-west lines by which the land was originally divided for sale from the government to the people. Road-making is generally done by a scraping machine, which throws the soil from a ditch on either side to an arch in the middle; in wet weather they have many sloughs, where waggon wheels sink hub-deep. In the villages and cities vitrified brick is coming to be largely used for paving, in the absence of good road metal. Barbed wire is now almost universally used for fencing on the treeless prairies.

The broad surface of the drift plains is here and there interrupted by looped belts of low hills, convex southward; these are the terminal

moraines of the ice lobes into which the front of the glacial sheet was divided; each trough of low ground on the north allowed the ice to move faster and further forward, while each district of higher ground, like the Allegheny Plateau of eastern Ohio, the uplands of lower Michigan, and the highlands of Wisconsin, retarded the advance. Although of moderate relief, the morainic belts are usually the only hills visible over hundreds of miles of prairie, hence they commonly serve to define the subdivides between river headwaters, although not ranking as equals in this respect with the upland belts of the ancient coastal plain. The moraines have a moderately rolling surface, they are sometimes strewn with boulders; their hollows contain numerous ponds and marshes.

Effect of Glacial Action on Drainage.—Rivers running from the glaciated area bore with them an abundant load of waste, and thus built up their valley floors into broad flood plains; but since the disappearance of the ice and the decrease of the waste furnished to them, the rivers have trenched the valley flood plains, forming terraces, and sometimes producing falls and rapids where the entrenching streams have cut down upon buried ledges; but the water power thus provided is much less than in New England, on account of the small relief of the region and the slow descent of the valley floors. The lakes which gathered on the land that sloped towards the retreating ice sheets marked their shore lines with beaches, many of which are so well preserved that they are used as naturally graded roads. The outlets of these glacial lakes were at the lowest passes across the height of land on the south. Strong rivers ran from the greater lakes, scouring out broad channels, now abandoned except by the waters of such small side streams as happen to enter them. A well-defined channel of this kind is incised to a slight depth across the drift-covered surface of northern Indiana, where the waters of the expanded Lake Erie (when its present outlet was obstructed by ice) ran out by the Wabash, Ohio, and Mississippi rivers. Another channel discharged the expanded waters of Lake Michigan to the headwaters of the Illinois river across the south-western border of the lake basin; there an Indian portage was naturally found when white settlers entered the region; a military outpost, Fort Dearborn, was established on this travelled path early in the nineteenth century, and there Chicago has since grown. The old channel of overflow has been a little deepened, a current of water is drawn through it from the lake to the Mississippi system, and the drainage of the city is thus to be disposed of in the future.

Chicago is the epitome and climax of the prairie and lake region. Its lofty buildings disclose a boundless prairie to the west and south, and a boundless blue lake to the east. No other city in America is the focal point of so many lines and systems of railroads. No other lake port has so valuable a commerce. No other city in the world has grown to so huge a population in so short a time—an empty prairie in 1830; more than a million of population at the close of the century. From an idle military

post, Chicago has risen in seventy years—the span of a single lifetime—to a sensationally active market for traffic in cattle, grain, and lumber ; as the centre of trade for a vast region, it feeds the east and furnishes the west. The immediate site of the city had few advantages for the seat of a great population. The ground was so low and flat as to be poorly drained, and after the growth of the city had been well begun, the buildings and streets had to be raised to a higher level than that of the natural prairie. The lake shore was open to storms, and the little river that alone gave protection to shipping had to be enlarged like a canal before it could admit many vessels. To counterbalance these disadvantages, Chicago stands in the midst of a vast prairie region, at a point where all overland travel from the east must turn round the southern end of Lake Michigan on the way to the great North-West ; and to this fact of general relations much more than to any immediate local advantage has the great city owed its growth. Rapid growth has not been altogether an advantage, for a city that has increased in population so fast as Chicago cannot have exercised a careful selection in the choice of its new members. Like other great cities, it exhibits many of the unattractive sides of human nature, but from about the time of the Columbian Exhibition of 1893, various signs of better growth have appeared. The innumerable railroads all originally crossed each other's tracks on the level, but the correction of this difficulty is now actively in progress. The immense wealth gathered in the city has found new application in the establishment of a university and a museum, whose development has advanced by wondrous strides. Already the centre of population has passed the meridian of Chicago. However important the harbour cities may be in relation to Europe, the great interior City on the Lake promises soon to outrank them in all domestic relations.

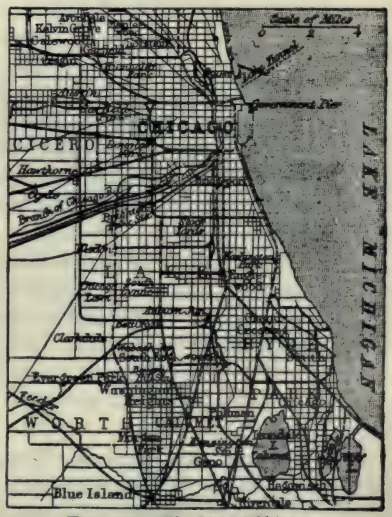

FIG. 359.—*The Site of Chicago.*

Niagara and the Great Lakes.—A whole series of events reaching from the close of the glacial period past the present into the future, associate Niagara river, the Great Lakes, and the city of Chicago in a most curious history. The lakes, except Superior, occupy lowlands or depressions which, as has been pointed out, are closely dependent upon the structure of the ancient coastal plain between the Laurentian highlands of Canada and the Ohio prairies. Although the problem of the

origin of the lakes is still unsolved, their history during the retreat of the latest ice-sheet has been well deciphered during the last twenty years, and now offers a consecutive story of extraordinary interest and importance to the geographer. As the ice withdrew from its last great advance numerous small disconnected water bodies were formed along its margin; but as the retreat of the ice continued, the many small lakes coalesced into a few lakes of much larger size; and ultimately perhaps all these were reduced to a single sheet of water of very irregular outline, escaping to the Mississippi by a single outlet at the site of Chicago. This outlet was probably maintained while the ice still lay heavily on the lands to the north-east; but as the ice front withdrew, lower outlets were offered, first eastward by the Mohawk to the Hudson, then north-east by the St. Lawrence as to-day. As the change from the southern to the eastern drainage was approaching, a considerable river ran along the trough defined by the northern slope of the Allegheny Plateau in central New York, and the southern slope of the ice front; this being known by the channels cut across the spurs of the plateau in the neighbourhood of Syracuse, where they are conspicuous features. Later on, when the eastern discharge was fully established, and the Chicago outlet was abandoned, the great marginal lake was divided into a larger western and a smaller eastern part by the Niagara upland between the Erie and the Ontario basins; the latter overflowing down the Mohawk while the ice still filled the St. Lawrence valley, and afterwards sinking to a lower level when the St. Lawrence valley was opened. Several lines of discharge for a time flowed northward across the Niagara upland, and fell down its north-facing bluff into the lowland beneath; but of these only the Niagara river has survived; its fall has now been worn back nearly seven miles from its original position.

During all these remarkable changes the land was slowly rising in the north-east, as if relieved of the weight of the ice by which it had been for a time depressed; this being known by the gentle north-eastward ascent of the earlier lake-shore lines. The change of level thus brought about had much influence in determining the location of the successive lake outlets. As the ice sheet uncovered the lowlands of south-western Ontario, a line of discharge was opened eastward from Georgian Bay at a lower level than the roundabout flow through Lake Erie; and for a time the upper lakes were allowed to discharge directly eastward. During this interval only Lake Erie fed Niagara, and the part of the gorge then cut by the reduced river is much narrower than that of earlier and later dates. As the land rose in the north-east, the path of the discharge eastward from Georgian Bay became too high for the lake outlet; hence the waters of the upper lakes again ran round through Erie, Niagara was restored to the full volume which it has since maintained, and the gorge was cut to full width again. A consequence of the variation in the width of the gorge is seen in the position of the two great railroad bridges by which it is crossed;

they are close together, spanning the narrow portion of the gorge that was cut while the volume of the Niagara was diminished by the diversion of the upper lake waters to the more direct outlet across the Ontario district.

The rise of land in the north-east not only turned the discharge of the upper lakes back to Erie and Niagara, it raised all the lake waters on their south-western shores; thus a number of little valleys were flooded into bays, furnishing harbours such as that which determined the location of *Toledo* at the south-west end of Lake Erie. By a similar movement, the water at the southern end of Lake Michigan has been raised again from the level that it must have had while the land was lower in the north-east and the eastward outlet was maintained from Georgian Bay; thus the Michigan waters have returned very nearly to the level of the earlier time, when the northern end of the lake was blocked by ice, and the outlet ran south-westward past the site of Chicago. Not only so; the rising of the land in the north-east and resulting change of water levels still continues, and at a rate rapid enough to be discovered in the brief period during which accurate measurements have been made of the lake waters. An examination of a number of authentic records by Gilbert has shown that there is a tilting of 0·42 feet in a hundred miles in a century. If continued, the backing up of the waters on the southern end of Lake Michigan will be much faster than their lowering on account of the work of Niagara in wearing down its falls; and in two or three thousand years all the lakes but Ontario will again be tributary to the Mississippi river.

The Upper Mississippi River.—No one can say where the source of the Mississippi River lay in pre-glacial times. Its present head in Lake Itasca is not determined by the long and slow adjustments characteristic of river sources in mountainous regions, such as the Older Appalachian Belt of North Carolina, but by the accidental position of a small lake in a morainic region. Its upper course strays across a comparatively open country, guided as much by the irregular deposits of drift as by the form of the underlying rock. It has incised a narrow and shallow valley, but is still too young to have worn down its many falls and rapids. Settlements have sprung up at many of the water powers thus determined. The most important of these is *Minneapolis*, at the lowest and the largest of the falls, those of St. Anthony, now famous for driving extensive flour-mills, where much of the wheat of the north-west is ground. Between the neighbouring cities of Minneapolis and St. Paul the narrow valley of the young Mississippi joins a broader valley now occupied by the Minnesota river, but formed by the large overflow of the glacial Lake Agassiz. The broader valley is thenceforward followed southward, *St. Paul* standing on its border at the head of navigation; and thus the "twin cities," too close together for the needs of the region, are forced into an over-active rivalry. Lake Pepin, a short distance below St. Paul, is an expansion of the Mississippi caused by an abundant deposit of drift that was washed into the valley by the Chippewa river from the north-east, probably at a time

when the volume of the latter was enlarged by contributions from the melting ice sheet. Further on, the river generally possesses a flood plain a few miles in width, bounded by strong bluffs which ascend to the rolling prairie ; here the valley probably follows the course of the pre-glacial Mississippi ; but occasionally the river trough is much narrower, as if the pre-glacial course had been obstructed by drift, and a new course had been carved in post-glacial time. Masterful as the river is, it cannot pretend to great antiquity. It is the modern representative of an ancient river, but it departs in many ways from the habit of its predecessor. A number of thriving cities of moderate size—*Dubuque, Davenport, Burlington, Quincy* —are built on the valley floor or border ; their first advantage coming from the great north-and-south waterway ; but to-day the river is of little importance as compared to the railroads running east and west. Indeed, the river is now more of an impediment from having to be bridged, than an advantage as a public highway.

The Ohio River. — The Ohio and its northern branches resemble the upper Mississippi system in many ways. Its trunk stream is now old enough to have opened a good flood plain between the enclosing hills. The head waters rise on drift barriers, by which the pre-glacial drainage system has been greatly modified. Many valleys that formerly discharged to Lake Erie are now blocked by moraines, and turn part of their waters to the Ohio. There is growing reason for the belief that a number of streams from as far south as the West Virginia plateau originally ran northward across Ohio to Lake Erie ; that an ice blockade of their lower (northern) courses in an early epoch of the glacial period caused them to rise in lakes and overflow westward across the hills at the lowest passes they could find ; and that in this accidental way the upper and middle Ohio valley was developed. If so, this river, by which so many settlers found their way to the prairies, is an indirect consequence of glacial action, like the water powers on which the manufactures of New England at first depended. Only the southern branches of the river can lay claim to great antiquity. *Cincinnati* and *Louisville* are the chief cities on the middle Ohio ; both profiting more largely to-day from the rich agricultural districts behind them, and from the railroads that lead across country, than from the rivers to whose advantages their location was originally due. Coal and lumber is still floated down the river from the hills of the Allegheny Plateau ; but the large river steamboats and their voyages from Pittsburg to the Mississippi are almost things of the past. Small river-boats to-day have a share of local traffic, but the railroads absorb nearly all the long-distance transportation.

All these rivers are subject to severe floods, those of the Ohio being especially disastrous ; many of its branches, especially in the plateau district, gather rainfall rapidly from their steep valley sides. No lakes are present to equalise their discharge, the Ohio being strongly contrasted with the St. Lawrence in this respect. A destructive rise of from forty to

sixty feet, submerging the whole valley floor, and drowning the streets of many a village, must be expected once if not oftener in a decade.

The Climate of the Ohio Region.—Cold winters and hot summers, with an equable distribution of rainfall through the year, are the leading features in the climate of the Ohio region. The hot summers are so productive that the cold of the winters is easily survived. The position of the region between the warm Gulf of Mexico on the far south, and the open plains of Canada on the far north-west, gives an unpleasant violence to its weather changes. The light southerly winds that prevail in front of cyclonic areas in midsummer cause excessive temperatures with high humidity under a hazy sky; prostration from sunstroke is of common occurrence in the cities during these spells of true "sirocco" weather. The Atlantic cities are subject to the same affliction, but seldom of so great severity as on the prairies. As the cyclonic centre passes eastward, the wind shifts to west or north-west, the sky clears to a bright blue, and the temperature falls to a moderate degree. Violent thunderstorms and tornadoes often mark the transition from one weather type to another. In contrast with these excessive heats of summer and their cool waves are the mild southerly winds of winter and their cold waves; the latter are piercing blasts that sweep suddenly down from the Canadian plains, reducing the temperature to zero or lower, and causing sudden frost after the thaw of the southerly winds. Like the warm waves of summer, the cold waves of winter reach the Atlantic coast, even as far south as Florida, but with diminished intensity as they move forward from their remote northern source.

THE SOUTHERN COASTAL PLAIN

The Southern Coastal Plain.—The account already given of the Atlantic Coastal Plain as far south as the Carolinas prepares the way for following its extension westward, where it wraps around the southern Appalachians and turns into the Mississippi embayment. The mountains gradually decrease in height, although preserving their disordered structures in full strength, and thus disappear below the covering strata of the coastal plain in northern Georgia and Alabama. With the burial of the mountains, the granite and marble quarries of the older belt, and the coal and iron mines of the newer belt, give way to the agricultural industries of the plain. The plain is well dissected and hilly in the interior, with local relief of from two to four hundred feet; it gradually descends towards the coast, and there falls to broad prairies, recently emerged from the waters of the Gulf, still flat and marshy. Pine forests cover much of the region, yielding valuable lumber as well as resinous products. The population is generally rural or gathered in small villages; even the largest cities are of moderate size. Middle Alabama offers the only peculiar feature that deserves special description; this is a belted arrangement of form, such as has been described for New Jersey. An inner lowland

borders the older land of the Appalachians; an upland known as Chunnenugga Ridge encloses the inner lowland; and the outer slope of the "ridge" descends to the flat coastal prairies. The inner lowland has been worn down on a weak, loose-textured limestone; its flat surface is covered by a rich soil, and here is the chief cotton belt of the State with the largest cities of the agricultural district. Being without good road metal, the roads are often impassable in the spring; the traveller must then mount a horse and take to the fields. The "ridge" stands up because its strata are more resistant than those of the inner lowland; being sandy for the most part, their soils are relatively infertile. The coastal prairies are low, because they have never been uplifted high; they are smooth because they cannot be dissected while standing near sea-level. *Mobile*, at the head of a bay formed by drowning the lower valley of Alabama river, the result of a slight depression of the region, is the chief port of the Gulf coast, east of the Mississippi.

FIG. 360.—*The Alabama Coastal Plain.*

Slavery.—The Southern Coastal Plain is chiefly responsible for the grievous affliction of slavery that so long blighted the southern States and poisoned the whole country. The settlements of the whole Atlantic coast were at first to blame for the iniquity, for slaves were originally held in New England as well as in Virginia and the Carolinas; but in the north slave labour was of so little profit that sordid motives did not deceive the awakening conscience of the people; and before the system gained a strong hold it was uprooted. In the south, on the other hand, slave labour on the plantations became extremely profitable; and moreover, the heat of summer, it has often been asserted, was too severe for white labourers. The principles of the people very naturally followed their profitable practice, and slavery became an established institution. The population was thus divided into three chief classes, the white slaveholders, the landowners and leaders, financially and politically, of the south, men of wealth, ability, and high position; the poor whites or "white trash," in large part the descendants of very undesirable colonists of early days, owning no slaves and very little property, lazy, ignorant, and poverty-stricken, despised by both the other classes; and the negro slaves, with no property or influence whatever. To these three classes a fourth may be added; the sturdier people of the uplands, inland from the coastal plain, often owning no slaves, sometimes owning a few, not profiting enough by the system of slavery to be strongly attached to it, yet not sufficiently wealthy or politically important to exert much influence, and too generally casting what influence they had with the more ardent slaveholders as against the people of the north.

If the distribution of the wealthy and the influential slaveholders were charted, it would be found to be closely associated with the Southern Coastal Plain, and especially with the belts of richer soil. The piedmont border of the Appalachian belt, the inland Appalachian valley (the Shenandoah valley of Virginia and the Valley of East Tennessee), the flood plain of the Mississippi and the isolated limestone basins of western Tennessee and northern Kentucky (the Blue Grass country) were also profitable slaveholding districts; but the stronghold of the system was on the coastal plain. Better that the plain should never have grown a pound of cotton, better that its fertile strata should never have emerged from the waters of the sea, than that slavery and its direful, long-lasting consequences should have come upon the United States. Now after a dreadful struggle, slavery is abolished and better conditions are ushered in. Considerable sums of public money are devoted by the several States to the education of the negroes, but always apart from the whites; many schools are supported by contributions from the northern States; some advance is made in the ownership and cultivation of land and in the practice of trades; but political rights are practically withheld from the former slaves; there is still a great body of poor and ignorant negroes —often a majority of the population—set apart from the whites by all the prejudices that divide the races of mankind. The coastal plain has much to answer for, in so far as it led to this unhappy condition.

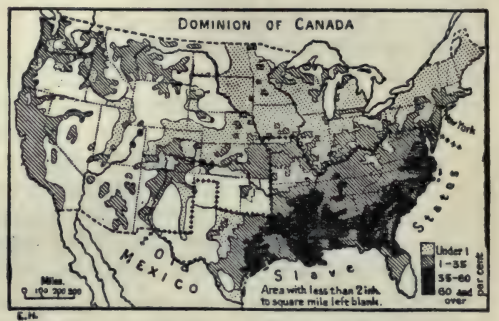

FIG. 361 —*The Old Slave States and the present Distribution of Negroes.*

Florida is an anomalous out-growth from the Southern Coastal Plain, a low up-arching of the sea floor, nowhere reaching more than a few hundred feet above sea-level. Much of its interior is underlain by limestones; here numerous lakes are found as if occupying cavities dissolved out of the soluble rock, and many streams disappear in "sinks," emerging elsewhere in large springs. Nearer the coast the land is low and often marshy, especially in the south where the grassy Everglades form an impenetrable wilderness, and where the shore line is often bordered by mangrove swamps, especially on the western side. Remnants of Indian tribes are still found in this untamable country. The eastern coast is bordered by extensive sand reefs with remarkably even shore lines, enclosing long narrow lagoons. In Florida, as well as further north to Carolina, there are strata so rich in phosphatic deposits—largely derived from the bones of sea animals—as to be valuable as fertilizers; they are already

excavated in shallow pits and exported in considerable quantity ; but this industry is only in its infancy, awaiting the further exhaustion of the soils in the northern farms for its full development. The southern extremity of Florida and the outlying islands are coral reefs ; in part slightly elevated and worn down again ; in part growing at sea-level ; thus resembling the extensive banks of the Bahamas to the south-east.

The far southern reach of Florida between the Atlantic and the Gulf waters gives it an almost torrid climate. It has a plentiful rainfall, with a stronger maximum in summer than is found anywhere else in the United States. Tropical cyclones frequently pass the Florida coast in the late summer or early autumn, on their curved track between the West Indies and the North Atlantic. They sometimes cause disaster on the low coastal lands by brushing the sea-water ashore in storm tides, as well as by overwhelming the unwary mariner ; but their coming is generally announced by the Weather Bureau. The mild winters of Florida attract many invalids from the more severe climates of the northern States. The high mean temperature permits the cultivation of subtropical fruits, which are sent in large quantities to the northern markets ; but a cold wave occasionally sweeps down from the north-west in the late winter and freezes the orange trees and early vegetables ; hence fortunes have been lost as well as made in the orchards and farms of Florida. *Key West*, on an island off the south end of the peninsula, is the United States naval station for the Gulf.

The Lower Mississippi.—During the deposition of the strata of the Southern Coastal Plain, a strong embayment occupied the place of the lower Mississippi. As the region was elevated, many rivers, formerly independent, were engrafted on a single trunk, and thus the "father of waters" was formed. The upper Mississippi deserves no higher rank than the Ohio and the Missouri ; indeed, in the matter of age, the Ohio headwaters in the Black Mountains of North Carolina and the Missouri headwaters in the Rocky Mountains of Montana, Wyoming, and Colorado, are much more venerable than the post-glacial parvenus of the upper Mississippi in Minnesota ; but the lower Mississippi combining them all is truly a great river. The early French explorers of North America entered the interior by its two chief waterways, the St. Lawrence and the Mississippi. Their presence is revealed by many names still in use, such as Quebec and Montreal, New Orleans and Baton Rouge, St. Louis and Louisiana. The defeat of the French at Quebec transferred all their possessions on the northern river to British control. The purchase of Louisiana brought a western empire into the possession of the United States. In both cases the upper basin of the river followed the fate of the mouth.

Although bearing a heavy load of silt, the great volume of the Mississippi enables it to establish a channel of very gentle slope. Its vigorous meanders, swinging now this way, now that, have alternately worn back the bluffs on the east and west so that the flood plain has gained a breadth

of from thirty to sixty miles over a length of 600 miles. The greater part of the plain slopes gently away from the river banks, and is therefore liable to be flooded at times of high water. Hardly a year passes but a moderate flood occurs in one part or another; hardly a decade without a devastating inundation. Near the river the plain is partly cleared and cultivated: its rich soil produces abundant crops of cotton and sugar cane. Further back upon the river a great part of the plain is not yet cleared. Southward, the flood plain continues into the delta, which is rapidly building forward into the Gulf. The river there divides into a number of outgoing branches or distributaries, each of which is enclosed in its furthest advance by low and narrow banks of mud. Few deltas in the world more clearly exhibit in their digitate outline the intention of their river; few are more indifferent to the desire of the waves to turn their front into a smooth convex curve. The mouths of the distributaries are known as "passes"; at one of them, jetties have been formed to confine the river breadth, increase its velocity, and thus cause it to scour out a deeper channel for the advantage of navigation. No large cities have grown upon the flood plain except *New Orleans*, the chief city of the Gulf coast, the harbour city where internal and external commerce meet. Its population contains many Creoles—Americans of French ancestry—and many Italian immigrants. *St. Louis*, although above the mouth of the Ohio, may be regarded as standing at the head of the great flood plain. In earlier years, when river transportation was at its best development, the two cities of the lower Mississippi were intimately connected; a voyage on a Mississippi steamboat was an experience *sui generis*, in the way of boat construction and navigation, as well as in the chance of meeting with planters and gamblers, and of seeing a cargo of "slaves, cotton

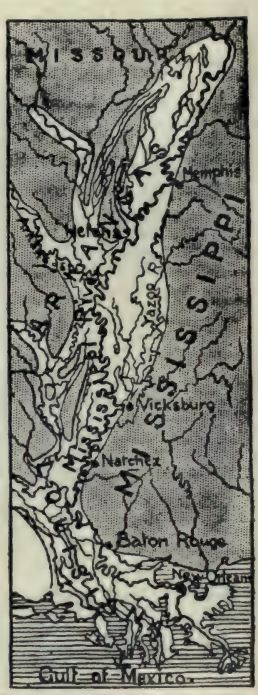

FIG. 362.—*The Mississippi Flood Plain (white).*

FIG. 363.—*The end of the Mississippi Delta.*

and other merchandise." The trip may still be made; there are still shifting sand bars on the "crossings" between the river curves, and there is still a great extent of unoccupied forest along the river banks; but here, as well as further north, the rapid transportation of the railroad is largely replacing the slower movement of the river boat, except for local traffic supplied by the settlements on the flood plain itself. Between New Orleans and St. Louis, the chief settlements are at points where the swinging river touches the bluffs on one or other side of the plain. Happening in this century to lie nearer the eastern side of the plain than the western, *Memphis, Tenn., Vicksburg, Miss.*, and *Natchez* and *Baton Rouge, La.*, are on the eastern bluffs. *Helena, Ark.*, is the only important city on the western bluff below St. Louis. To these must be added *Cairo, Ill.*, at the junction of the Ohio and Mississippi.

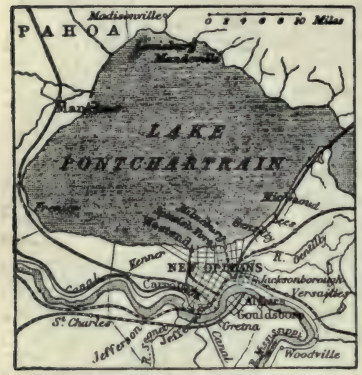

FIG. 364.—*The Site of New Orleans.*

If engineering skill ever suffices to control the floods of the Mississippi, to restrain the shifting of its meandering channel, and to drain the "back-swamps" of its flood plain, the whole surface may be cultivated. Already some steps have been taken toward this profitable end. A Mississippi River Commission has constructed elaborate maps of the river, and extensive dikes or "levees" are constructed along its banks. Another century may see great advance made from this beginning, and then the product of the Mississippi flood plain will be proportionate to its vast extent and its inexhaustible fertility.

TRANS-MISSISSIPPI STATES

The Trans-Mississippi States.—The tier of States from Minnesota to Louisiana immediately west of the Mississippi presents an epitomised review of what has already been described. Northern Minnesota is an extension of the Laurentian highlands, a region of ancient rocks worn down to moderate relief, rich in iron ores. It is abundantly strewn over with sheet drift and heaped moraines enclosing innumerable lakes. Its northward slope, with that of eastern North Dakota, drained by the Red River of the North, was the seat of the vast glacial-marginal Lake Agassiz, stretching far north into Canada against the retreating ice, and overflowing at a dip in the height of land on the south, where the channel now followed by the Minnesota river was cut. The shore lines of the lake and the deltas of inflowing rivers on the east and west are not less distinct than the channel of its outlet, although now abandoned by the waters that made them. As with the Laurentian glacial lakes, the shore lines of Lake

Agassiz now rise northward at a slight inclination, proving an elevation of the land in the north during and since the disappearance of the ice sheet. The lake-floor, a vast treeless prairie, one of the most nearly level tracts on the face of the Earth, has been occupied by great wheat farms; the fine texture of its soil, the smoothness of its surface, and its freedom from forest growth have promoted its rapid settlement, while the rolling drift country on the east and west, with its stony moraines, its abundant forest growth, and its many lakes and swamps, is less generally occupied. Here as elsewhere in the north-west, Scandinavian immigrants are numerous.

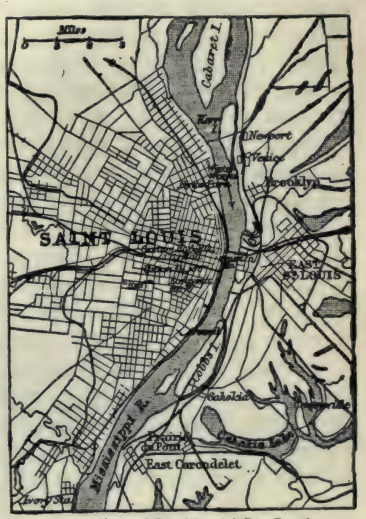

FIG. 365.—*The Site of St. Louis.*

Southern Minnesota, Iowa, and northern Missouri—and the adjoining parts of South Dakota, Nebraska, and Kansas—resemble the western prairie States of the Ohio region. The surface is underlain by nearly horizontal strata of ancient date, similar to those which stretch southward from the Wisconsin highland. There is the same general concealment of rock ledges, except in the banks of the post-glacial stream courses; the same wide expanse of gently undulating plains of till, the same ornamentation by belts of hilly moraines. Most of the surface is treeless prairie, very fertile and widely cultivated. Many villages and small cities have sprung up, but there are as yet no large cities. Railroads are almost as plentiful as east of the Mississippi. There is no part of the United States in which the succession of earlier and later drift sheets is so well displayed. In the northern part of this district the forms produced by the ice are hardly modified, except close to the sharp-cut stream lines; the till plains are still undissected, lakes are still present in the moraines: here the drift is very young. In the southern part there are no lakes and the surface of the drift is well carved by numerous branching streams into an undulating surface: here the drift is comparatively old. The interval between the earliest and latest ice advances must have been much longer than between the latest advance and the present day. The fertile loess mantle that so generally cloaks the more southern drift is distinctly associated with one of the earlier advances; the latest advance produced no loess, but gave forth energetic rivers that bore streams of gravel along the valleys far beyond the terminal moraines.

Tornadoes of the Mississippi Basin.—The plains immediately to the west of the Mississippi vie with those immediately to the east of the

river in affording opportunity for the development of tornadoes during the spring and summer months. These violent and destructive whirlwinds are now shown to be almost limited to the south-eastern quadrant of large cyclonic or low pressure areas, in that part of the cyclonic track and in that season which provides strong contrasts of temperature and humidity in the inflowing winds. The same great cyclonic storm, a thousand miles in diameter, may be followed in its eastern progress all across North America, and far out upon the North Atlantic even to north-western Europe. The general circulation of its whirling indrafts is alike during its entire journey of five or ten thousand miles; but only on passing the middle Mississippi basin in spring or summer are tornadoes frequently developed. They occur within thunderstorms, but by no means within every such local storm; hence it may be inferred that their development depends on highly specialised conditions, such as warm and moist southerly winds in the lower atmosphere, and a probable overflow of cool and dry westerly winds aloft. The destructive tornado whirl, within which hangs a writhing funnel-shaped cloud, is seldom over a thousand yards in diameter. It travels rapidly, usually from south-west to north-east, averaging thirty miles an hour, while the velocity of the winds themselves must exceed a hundred miles per hour. The storm comes out of the cloudy west with little warning, lays waste its narrow path with a frightful roaring, and quickly disappears across the prairie. Trees and buildings are violently destroyed in a moment, if the full force of the whirl comes upon them. Little wonder that those who have witnessed but escaped a tornado's fury are nervously apprehensive when dark clouds gather over the western horizon in sultry summer weather.

The Missouri Highlands.—The Missouri river roughly follows the border of the drift area on the west of the Mississippi, as the Ohio does on the east. There is some reason for thinking that the course of the river was determined when an early ice sheet lay on the country to the north-east of it, thus increasing its resemblance to the Ohio. It is now a well established river, with a flood plain generally several miles wide, incised one or two hundred feet below the uplands on either side. Many towns, like Jefferson City, the capital of Missouri, occupy the bordering uplands where the swinging river impinges against the base of the bluff; thus showing that here, as on the Ohio, river travel was important before the days of the railroad. Now many steamboats are rotting at their wharves.

South of the Missouri, the land rises gradually to the Ozark Plateau (Oz in Fig. 353), a broad flat dome of Palæozoic strata, in general less dissected, but singularly like the Allegheny plateau in many respects. The uplands include a number of ragged *cuestas*, that is, reliefs determined by the harder members of the plateau strata whose gently inclined position causes them to form escarpments of irregular front, two or three hundred feet in height on the outcrop side, but descending slowly to lower ground in the direction of their dip; the belt of lower ground between the back slope of

one cuesta and the escarpment of the next being the surface expression of the weaker strata that lie between the cuesta-makers. The chief river valleys are cut down beneath the level of the belts of lower ground, and are therefore doubly deep in their passage through the uplands of the cuestas. They are generally steep sided and narrow floored: some of them have singularly meandering courses, like that of the Osage. The population is gathered on the broader interstream uplands, and is almost exclusively engaged in agriculture. The chief exception to this statement is found in the St. François Mountains, eastward from the higher parts of the plateau, where iron mining flourishes; this being the natural result of the emergence here of several ancient mountain summits that rise through the stratified rocks of the plateau from a buried Archæan land surface. Iron Mountain is one of these summits; Pilot Knob, a landmark seen from afar, is another. The plateau slowly decreases in height and increases in ruggedness on approaching its border in northern Arkansas. Across its whole breadth, there is an increase in the abundance of natural tree growth, in contrast to the treeless prairies of Iowa; the rugged southern part of the Ozark Plateau is abundantly forested and thinly inhabited.

The Arkansas Highlands.—The lower country of central Arkansas, next beyond the southern border of the Ozark Plateau, is determined by the upturning of the strata, which from the beginning of their overlap on the Archæan floor of northern Minnesota had been almost horizontal. The denuded folds of the crushed rocks form the Ouachita Mountains, occupying a belt that trends east and west across middle Arkansas, disappearing under the embayment of the Southern Coastal Plain to the eastward, and extending far into the dry country to the westward (Ou in Fig. 353). Here so many repetitions of the Appalachian structure and form have been found that the Appalachian mountain-making disturbance of Permian time is now recognised as extending far beyond the limits originally assigned to it in Alabama. The harder strata stand up as ridges of moderate height, turning in angular zigzags of true Appalachian habit; the streams cut through the ridges in sharp water gaps; the farming country lies in the basins and "coves" divided by the ridges. Certain sandstone layers in the ridges are of extremely fine texture and are extensively quarried for whetstones.

The uneducated population of the South is at its worst in the "piney woods" of central Arkansas. Whether because of inferior ancestry or because of the blight of slavery, the people of the country districts, white as well as black, are here miserably degraded. As so often elsewhere in the South, the shiftless farmers often buy seed for spring planting with money borrowed on the prospect of the autumn's harvest. They show little desire to improve their condition, and remain ignorant, badly housed, roughly clothed, and poorly fed from generation to generation. Some of the inertness of the people may be charged to the extreme heat of the summers; but from whatever cause, their slow progress makes a sad

contrast to the rapid emergence from frontier conditions in such States as Wisconsin and Iowa. Amid rural surroundings so deplorable, it is natural that the urban population should grow slowly, and that manufacturing and mercantile activity should be at the lowest ebb. *Helena* on the Mississippi and *Little Rock* on the Arkansas, the chief cities of the district, are only of local importance.

The Red River Rafts.—Southern Arkansas is overlapped by the coastal plain which continues through Louisiana to the shore of the Gulf of Mexico, repeating many of the conditions already described for the region east of the Mississippi. Much of the surface is still forested, and the population is almost entirely rural and agricultural. The flood plain of the Red River deserves mention among the physical features on account of the famous "rafts" by which the river channel through it has been encumbered for distances of twenty or more miles. The rafts are formed by the accumulation of tree trunks that have been swept in time of flood from the forested flood plain further up the valley. The older trunks rot away at the lower end of the raft, while new ones gather at the upper end; thus the raft slowly moves up stream. In recent years a navigable channel has been opened through the raft above *Shreveport*, and kept clear by patrolling "snag-boats." Appropriate to the slow progress of the region, river transportation has not been so generally superceded by the railroads here as in the north. Partly on account of the obstruction of the river current by the raft, partly on account of the large amount of sediment brought down from the upper waters in the *Llano Estacado* of Texas, the flood plain of the Red River is rapidly aggrading or building up the valley floor. The side streams in Louisiana, unable to aggrade their valleys at the same rapid rate, expand on approaching the main valley, and thus form a number of lakes of unusual origin. The coastal prairie offers little temptation to settlement. Its surface is so low, flat, and marshy as generally to be unfit for cultivation; its shore possesses no good harbours, and is subject to storm floods from the sea.

The Coastal Plain of Texas.—The Southern Coastal Plain extends south-westward into Texas. Its shore line sweeps in a long concave curve from the fingered delta of the Mississippi to the rounded delta of the Rio Grande. For nearly all this distance the low margin of the plain is bordered by off-shore sand-reefs, built by wave action in the shallow waters of the Gulf. The reefs are of extraordinary continuity, by reason of the weakness of the tides. Padre Island, the reef that extends northward from the Rio Grande delta, measures nearly a hundred miles without a break, and in this respect is strikingly unlike the broken reefs and sea islands of South Carolina, where the much stronger tides maintain many openings leading from the mainland to the sea. Texas is so poorly provided with harbours that its chief port, *Galveston*, is situated on one of the off-shore sand reefs, where it was devastated by a hurricane and simultaneous sea-flood in 1900. The other ports are on shallow bays (valleys in the

coastal plain, slightly drowned), accessible only to vessels of moderate draught through narrow inlets of the sand-reef.

The coastal prairie is treeless except along the watercourses; it forms a vast grazing country. Further inland, the surface rises slowly, is dissected into a hilly expression, and is more generally wooded. Then follows the black prairie of smoother surface and more fertile soil, a great cotton district, like that enclosed by the Chunnenugga Ridge of Alabama. Here are the chief interior cities, including *Austin*, the capital. Finally, the long slope of the Grand Prairie, a Cretaceous cuesta of large dimensions, ascends to uplands of considerable altitude before descending by a ragged escarpment to the "central denuded region," a farming district of ancient rocks and diversified structure, form, and resources. The Cretaceous cuesta is traversed by valleys that lead rivers outward from the interior denuded region; but between the valleys its upland surface is relatively continuous, a great uniform expanse. Here already the rainfall is becoming deficient, foreshadowing the aridity of western Texas. The "Northers" of the Texas coast are winds that sweep down from the Great Plains, when a cyclonic area lies on the Gulf: in winter they are cold waves.

THE GREAT PLAINS

The Great Plains.—A vast sub-arid region, extending from the trans-Mississippi tier of States to the base of the Rocky Mountains, is known as the Great Plains. The eastern boundary of this division is indefinite; the dry plains merge into the more fertile prairies in the eastern part of the second tier of States west of the Mississippi. The plains are more varied in form than the name implies, and are indeed hilly enough over large districts to be called rugged. Even where most nearly level, they generally roll in broad swells, whose variation of height is frequently to be measured in scores of feet. Moreover, most of the rivers of the plains have incised their valleys to depths of fifties or hundreds of feet below the interstream surfaces; and the branch streams, gnawing headwards, produce a broken country on either side of the main valleys that is anything but plain. A dry climate excludes growth of trees, except along the streams, or on the higher hills and escarpments; and the name of the region is more an expression of the almost boundless view disclosed from every eminence than an indication of its precise form.

The dryness of the plains predestines them to a small population. To-day, with the advantages of many railroads, the traveller is impressed with the great amount of unoccupied space. Yet from this vast region, once deemed almost a desert, cattle are now shipped in great numbers to the more eastern cities, although they require a much greater grazing area than on the prairies. The Côteau of the Missouri in North and South Dakota, where the Great Plains enter the United States from Canada, is a broad upland, that descends with some approach to abruptness on its eastern side

into the lower ground drained by James River: it is the topographical expression of a series of Cretaceous strata which extend far west and south under the plains, and which here crop out to the eastward; it may be taken as marking the transition from the moister climate and more plentiful grass covering of the prairies further east, and the dryer climate and scanty grass covering further west. The upland is belted over with many moraines of rolling, hummocky, boulder-strewn surface, not high enough to be formidable, but uneven enough to be fatiguing to the drover, teamster, or horseman, and too stony to yield easily to the plough. In the absence of landmarks, one may easily be lost among the morainic hills and hollows. The abandoned channels of large glacial rivers are characteristic features of the drift-covered uplands; one may sometimes ascend the gentle grade of their broad floor between well-marked banks, and at last emerge on the top of a morainic belt, with a broad stretch of lower ground beyond; here the channel heads against the air, and here the source of its extinct river in the edge of the ice sheet must be inferred. The blizzard finds its best development on the broad Côteau. It is a violent cold-wave wind, at a temperature near zero F. or lower, drifting clouds of fine snow by which all landmarks are hidden. A guide of rope is needed in going a few hundred feet from a house to a barn in one of these freezing, blinding storms. Travellers on foot should be roped together, as if climbing Alpine peaks.

Beyond the Missouri to the Rocky Mountains in Montana, there is a great space of comparatively even plains, interrupted only by occasional eminences and by the sharply incised valleys of the larger rivers and their short branches. The eminences are of various types. The Little Rocky Mountains, near the Canadian boundary, are local upheavals of the underlying strata in a dome-like structure, now much denuded. The Bear Paw Mountains, also far north, are a group of peaks formed by the dissection of an ancient volcano. The Highwood and the Crazy Mountains, between the Missouri and Yellowstone rivers, owe their altitude to the network of igneous dykes and stocks which have locally indurated the enclosing strata. Various ridges, buttes, and mesas are the consequence of the better resistance to erosion of dykes and lava sheets, than of the weak strata of the plains. Taken altogether, these embossed forms prove that the surrounding plain is not smooth because it retains the form of the sea floor in which its strata were laid down (like the coastal prairies of Texas), but because it has been well worn down from whatever initial upper surface it once possessed. It is a true plain of denudation, with the remnant hills and mountains here and there to serve, like once overwhelmed nilometers, as minimum measures of the height to which the entire surface once rose. As a plain of denudation, the region must have been worn down so low that the rivers wandered idly upon its surface. The sharply intrenched valleys of to-day prove that the denuded plains have been broadly uplifted, with an inclination eastward, and this only long

enough ago to allow vigorous rivers to erode narrow valleys. There are few better examples of composite topography than this.

Hills of the Great Plains.—The hills and mountains that rise over the plains bear trees on their upper slopes. The plains are absolutely treeless, but offer good grazing ranges, and are now stocked with wandering herds of cattle. Although the winters are cold, the snowfall is very light; the cattle are left unsheltered on the open ranges all the year round, to get along as well as they can; they generally endure their winter privations, but severe losses occur during blizzards. Sheep cannot survive without protection and food. There is a tendency among the ranchmen to carry the name of "Prairie" far west to the thinly grassed upland plains, but thus used, the word is a deceptive misnomer. The uplands are out of reach of irrigation, but the valley floors, half a mile or more in width, are often watered by canals from the rivers: here cultivated fields produce good harvests. All the settlements are on the rivers: *Bismarck*, where the Northern Pacific railroad crosses the Missouri, *Fort Benton*, an early military station at the head of navigation of the Missouri, and *Great Falls*, where the revived river has developed a number of cataracts on a series of resistant sandstone layers, are examples; the latter uses its water power in various industrial works, as well as in driving street cars and in furnishing electric light. The homes of the cattlemen are likewise in the valleys, out of sight of one another and widely separated by the unoccupied plains. Important Indian reservations lie near the mountains, where the Red Man still remains in large numbers. The denuded plains extend along the Rocky Mountain border far south into Colorado, repeating the features above described except that the residual hills are comparatively rare. Here the upland surface is often strewn over with sheets of river-washed gravels, derived from the mountains, and of practical importance as water-bearing deposits. As in Montana, the rivers are now intrenched in valleys beneath the upland surface.

The Black Hills, in South Dakota and Wyoming, occupy an oval upheaved area, measuring about a hundred miles in its longer north and south diameter (BH in Fig 353). It is a dome-like mountain uplift on a scale intermediate between that of the Little Rocky Mountains of eastern Montana and of various members of the Rocky Mountains proper. Although the covering strata of the dome-like uplift have been greatly denuded, the hills surmount the plains by one or two thousand feet, and thus induce a local increase of rainfall. The Black Hills are, therefore, well forested, and their dark appearance, when seen in the distance, has given them their name. They supply much lumber to the ranches on the surrounding plains. The denudation of the originally arching strata has worn them back to concentric rimming ridges, and has revealed their foundation rocks of very ancient origin: and as these bear gold and silver, mining has come to be an important industry in the hills. Two railways have pushed their lines from the prairie States across the eastern plains to the Black

Hills, and now compete for freights from the mines as well as from the cattle ranges on the way. Here, as so often elsewhere, strong buttes mark the site of heavy "necks" of volcanic rocks and testify to the great and general denudation that the hills and plains have suffered. Mato Teepee, north-west of the hills, is the most remarkable of these forms, a great bare rock-shaft of columnar structure, six hundred feet in height, without a rival in the world.

The Bad Lands—the *mauvaises terres pour traverser* of the early French *voyageurs*—are named from their excessively rough and barren surface, the result of minute and detailed dissection by wet-weather streams. They are found in many parts of the western arid country, nowhere in better or greater development than along the branches of the Missouri north and south of the Black Hills. The fine-textured strata thus carved are in many cases of lacustrine or fluviatile origin and of Tertiary age; the result of accumulation in broad basins formed by slight warpings of the Great Plains. A wonderful series of mammalian fossils has been entombed in them. The dry climate of the plains allows only a scanty covering of vegetation; the fine texture and imperfect consolidation of the lacustrine strata promotes their denudation. Similar strata in a moister climate would be so well covered by vegetation that little work would be done by small streams and rills; most of the waste would wash evenly from the slopes to the larger valleys, or would creep slowly down hill in soil-cap motion, and the forms of the surface would be smoothly rounded. It is curious to note that in such cases, the vegetation supported under the greater rainfall largely counteracts the work that the rainfall would do alone; it is in dry regions that the direct work of small streams is best displayed, even though their action is intermittent.

The Sand Hills.—North of the Platte River a large extent of the Great Plains in Nebraska is occupied by low sand hills, or dunes, heaped by the wind from incoherent sandy strata. There is a scanty growth of grass in the hollows between the hills, and here, as well as elsewhere on the plains, great herds of buffalo wandered in the first half of the nineteenth century. But explorers and emigrants looked on the region as a desert, for it gave them little support during the slow progress of their waggons or "prairie schooners" across its monotonous waste. Yet to-day a railroad traverses this "desert" on its way to the Black Hills, and carries many cattle from ranches among the sand hills to eastern markets.

The loose texture of the strata of the plains exert an influence on the behaviour of its rivers as well as on the form of its bad lands and its sand hills. The rivers are so abundantly supplied with the waste of the land that they need a relatively strong slope on which to gain a velocity that will enable them to wash along their load. Hence, in spite of the considerable altitude of the plains—3,000 or 4,000 feet over vast areas—the valleys are of moderate depth, and the local relief is, therefore, less than it would be if the strata were more thoroughly indurated, and the valleys

more deeply cut. The Platte illustrates this principle in a striking manner, for its broad channel is little sunk below the adjoining plains. Its visible volume decreases by sinking underground from a good supply near the mountains to a comparatively slender stream wandering on a broad bed of sands in the sand-hill region. Only in occasional floods is the channel filled from bank to bank.

The Plains of Kansas ascend westward in a series of broad benches that are separated by east-facing bluffs of moderate height and ragged outline. These are similar to the belted uplands or cuestas of southern Missouri: each bench is underlain by a relatively resistant stratum, whose outcrop forms its limiting escarpment. The flood-plained valleys of the larger streams have little relation to the cuestas, but traverses them irregularly. While the eastern part of this region generally has a sufficient rainfall, the western part of Kansas reaches an arid region whose settlement has been attended by much misfortune. The practice of borrowing money with which to stock a new farm was here organised by loan companies; and it happened that between 1880 and 1890, when this business was at its height, the rainfall on the Great Plains was heavier than usual, and for a time all went well. Many enthusiasts believed that the climate had been favourably changed by the cultivation of the ground. Then in one of the times of decreasing rainfall, common to all semi-arid regions, crops failed, the disappointed settlers left their farms, and the eastern investor found himself the owner of a distant patch of worthless ground on the boundless plains. The legitimate use of borrowed capital in eastern Kansas and Nebraska, as well as on the prairies, has been beneficial both to borrowers and lenders in many cases where the farms were favourably situated, but the plains are still desolate; little settlements here and there in the valleys only emphasise the emptiness of the uplands.

Omaha, in Nebraska, and *Kansas City*, on the border of Missouri and Kansas, both on the Missouri river, are the chief cities of the western prairies, near the eastern borders of the plains. They have grown rapidly during the latter decades of the century, with the extension of railroads across the plains and the growth of cattle ranching. They are rivals as railroad centres and as cattle markets.

The Llano Estacado.—The Ouachita mountain range of middle Arkansas extends westward into Indian Territory and Oklahoma, interrupting the plains for several hundred miles, but disappearing beneath them before reaching the Rocky Mountains. This region is not yet well studied owing to its having been long set apart as a home for various tribes of Indians when they were removed from their original homes. It is followed on the south-west by the *Llano Estacado*, an even-topped plateau in northern Texas, confluent with the Great Plains in the north-west, gnawed on the north-east, east, and south by the head waters of many rivers that flow to the Mississippi and the Gulf, and divided from the mountains on the west by the valley of Pecos river. As a source of

sediment for fertile flood plains in a moister climate near the coast, the Llano is well placed; but its upland surface is too arid for profitable occupation, unless by wandering herds, and for these the scarcity of water is a formidable difficulty. In summer the plateau is intensely hot by day, and it is probably from this region and its fellows beyond the Mexican boundary that the "hot-winds" of Kansas and Nebraska are derived. These south-west winds are veritable scourges, for with a temperature of 95° or more and an extremely low humidity, they blight the fields over which they pass. They frequently affect narrow belts in the direction of their progress, as if their excessive heat was limited to a small current in the general movement of the winds. Fortunately they are of rare occurrence in their greater severity. It has been suggested that, like similar winds observed in northern India, the high temperature of these fiery blasts is immediately derived from compression during their descent from a considerable altitude; but it is manifest that they must have been previously heated when near the ground.

Denver is the only important city on the Great Plains. Thirty years ago it was reached only by stage-coach; now it is the focus of many railroads, some coming from the Mississippi valley, others entering the Rocky Mountains which rise a dozen miles away. There was originally nothing in the immediate surroundings of Denver to give it eminence over a score of other frontier settlements. It is built on Cherry Creek, which, like many another stream in the dry country, is a bed of sand and gravel during much of the year, but which occasionally rises in furious floods from cloud-burst rains. The neighbouring plains for a hundred miles are occupied partly as cattle ranges, partly as irrigated farms. The mountains beyond have mining towns here and there. The successful growth of Denver depends partly on the long distance by which the Rocky Mountains are separated from the cities of the Mississippi valley, partly on the contrast between the Plains and the Mountains; for even in the days of railroads, centres of trade must not be too far from their constituents.

THE ROCKY MOUNTAINS

The Rocky Mountains.—The Great Plains are terminated abruptly on the west by the front range of the Rocky Mountains, which rises from a base of 4,000 or 6,000 feet to summits of 10,000 or 14,000 feet. Many other ranges of similar height follow further west; each has its local name, as the Teton Range in Wyoming, south of the Yellowstone Park, one of the grandest mountain groups in the west; the Sawatch Range beyond the upper waters of the Arkansas in Colorado, with its chief peaks, Harvard, Yale, and Princeton, named after eastern colleges; the Uinta Range in Utah, exceptional in having an east and west trend nearly at right angles to its fellows; the Wahsatch Range in Utah, overlooking the arid basin of Great Salt Lake on the west. Although often of bold and vigorous

form, "needles" and "horns" are comparatively rare. Talus-covered flanks of uniform slope are extensively developed. The upper slopes stand high above the tree line, yet they gather only small snowfields and bear no glaciers except in northern Montana. The moraines of extinct glaciers are, however, abundant in many valleys. The middle and lower slopes are generally forested, except in the far south.

Geology of the Rocky Mountains.—The geological series in the mountain ranges extends from the ancient crystalline rocks through the Palæozoic and the Mesozoic to the early Tertiaries. Well-defined Devonian horizons usually have small thickness. The Carboniferous is a heavy marine limestone with no trace of coal. Workable beds of coal, chiefly lignite, occur in the upper Cretaceous and lower Tertiary. The long maintained conformability of the rock series, sometimes without a break from Cambrian to Cretaceous, gives an interesting contradiction to the early doctrine that a great break is always to be found between the Palæozoic and Mesozoic. The prevailing absence of metamorphosed sediments is a notable peculiarity. Igneous rocks are common in the form of intrusive sills and laccoliths, and in the Yellowstone region there are extrusive flows and agglomerates of great thickness and extent.

The structure of many ranges is anticlinal. The axis of the front range, south of the Missouri, is largely composed of granite, from which the bedded formations dip away with much regularity on either flank. The Uinta Range is still arched over by Carboniferous strata for much of its length. The Wahsatch is peculiar in being of synclinal structure, with an east to west axis at right angles to the range, and broken across by a great fracture that marks the eastern border of the Great Basin and exposes a vast natural section on the western slope of the mountains. North of the Missouri river, and extending into Canada, the front range also assumes a synclinal structure, with a great overthrust fault near its eastern base: here the lower Palæozoic formations are extremely heavy, while further south, where the anticlinal structure prevails, they are comparatively thin. Massive laccoliths form the resistant centres of some mountain groups in western Colorado; they are greatly denuded and elaborately carved, forming some of the most picturesque scenery of the region.

On passing from the modern, undisturbed strata of the Great Plains to the ancient, disordered structures of the Rocky Mountains, the pastoral industries of the one region give place to the mining industries of the other. Important deposits of gold, silver and copper have been profitably worked at *Cripple Creek*, *Leadville* and *Butte*; hundreds of less valuable deposits have led to moderate returns or to unknown losses; countless "prospects" have been tested by pick and shovel in all parts of the mountains, high and low. Modern methods of drilling rocks and treating ore are so rapid that already many mining districts are nearly or quite worked out; their excitable population, with the feverish accompaniments of saloons and gambling houses, have moved away to some

newer "camp." In spite of the scant half century of exploitation, deserted villages are no rarities.

Intermont Basins.—Many basins are found among the mountains, where broad surfaces of moderate relief attract the ranchman to raise cattle and wheat. Here railroads make their way between the ranges, and permanent settlements spring up. To this steadier class of population, as well as to the speculative and excitable miner, the future welfare of the region will be due. The basins are in all cases due to a deformation or warping of the mountain structure; they serve as gathering grounds for the rock-waste swept down from many centripetal valleys: deposits of gravel and sand a thousand feet or more thick having been formed in this way. The outflowing river of each basin escapes through the enclosing range in a gorge or canyon, usually so narrow and steep-sided as to be useless for roads, and passable only with great difficulty by railroads. In many cases the river has worn its canyon so deep that the floor of the basin is now dissected into bench land and flood plain: the latter is irrigable and serves for wheat land, the former is dry and serves only for pasture. In some cases the strata of the older basins, tilted by later disturbances and now more or less denuded, form low ridges lateral to the ranges that once supplied their sediments.

The intermont basins present at first sight every appearance of having been formerly occupied by lakes. In some cases the appearance is confirmed by the occurrence of fine silts appropriate to lacustrine conditions of deposition; but it often happens that layers of coarse texture and irregular stratification form a large part of the basin deposits, and hence it must be concluded that in such cases the warping of the basin did not proceed much faster than the filling of its floor and the cutting of its outlet, and that the deposits are fluviatile and not lacustrine. This conclusion is particularly fitting for those basins in which the floor is not level, but inclines from the margins to the river of discharge, after the fashion of piedmont slopes of mountain waste, the world over. Even if lakes were formed at brief times of more rapid warping, their depth was probably small and their duration short.

The San Luis Valley, an oval depression about sixty miles long, between two ranges in southern Colorado and northern New Mexico, is a good example of an intermont basin. The surface round the margin has a gentle slope towards the centre, and here the deposits are stony and gravelly; here the streams run out from the mountains in good volume. The central area is "as flat as a billiard table"; here the materials are sands and silts, and here the smaller streams wither away in the dry air. The stronger streams unite to form the Rio Grande, which makes its exit southward by a dark gorge through the mountains. Here, as in New Mexico generally, there are many traces of Mexican occupation in names and people. The Big Horn Basin, enclosed by a range and drained by a river of the same name in Wyoming, once resembled the

San Luis Valley in having a smooth floor, but now it is dissected to a depth of two or three hundred feet by the centripetal and the exit streams. The Green River Basin, in western Wyoming, drained by the Green river in a deep canyon through the Uinta Range, is now dissected so as to convert its once even floor into a labyrinth of bad lands, with local reliefs up to a thousand feet. The "Parks" that occur west of the front range in Colorado are intermont basins of greater height than usual—6,000 or 7,000 feet—with rainfall enough to support here and there a park-like growth of pine trees.

The Yellowstone Park.—An extensive intermont basin in north-western Wyoming has a plateau-like surface, built up by heavy lava beds; the numerous geysers which occur in it have led to the reservation of the region as the Yellowstone National Park. There are picturesque mountains bordering the basin; a few dissected volcanoes, like Mount Washburn, surmount the lava beds; but as a whole the scenery is relatively monotonous. The broad plateau is clothed with a pine forest through which the stage roads wind from one group of geysers to another. The geysers are associated with hot springs, around which siliceous deposits of great beauty have been formed. Yellowstone lake and Yellowstone canyon are grateful variations from the sameness of the forested lava plateau. This "park," which is nearly as large as Yorkshire, will always be preserved in a state of nature and serve as a refuge for native animals.

The Colorado Plateaux.—South of the Uinta Range in Utah, New Mexico, and Arizona, there is an extensive region of great altitude (over 6,000 feet) that is traversed by the Colorado river and its few branches in deep canyons. A heavy series of Palæozoic and Mesozoic strata, lying nearly horizontal, has been greatly denuded, so that the stronger layers now form great platforms ending in rugged cliffs and escarpments, while the weaker layers are worn back until they are hidden under the talus of the cliffs. In the north-western part of this area, great fractures divide the country into blocks, ten or twenty miles wide; and the adjacent blocks are moved unevenly, so that the edges of the higher blocks, now more or less battered by the weather, form cliffs one or two thousand feet high. Volcanic action has been plentiful. The deep-seated intrusions of cistern-like form, known as laccoliths, were first recognised in the Henry Mountains, a group of rugged forms in a greatly denuded region west of the Colorado river. Lofty volcanic cones, like San Francisco mountain, and extensive lava flows are scattered about near the Colorado canyon; some of the former are more or less dissected by radial valleys, others are symmetrical cinder cones hardly affected by erosion; some of the latter form mesas surmounting a more denuded surface, others are of modern date, still black and unweathered, occasionally forming stony cascades over the fault cliffs. This volcanic centre constitutes a striking exception to the rule that volcanic action is limited to continental margins and to the ocean floors. It is owing to a comparatively recent uplift of this denuded

region, after the cliffed platforms had been carved, that the larger rivers have incised their extraordinary canyons, 3,000 to 5,000 feet in depth.

The highest plateaux receive sufficient rainfall to be forested; the less lofty uplands are barren deserts, unattractive to the ranchman or the miner, however wonderful to the geographer and geologist. Where the plateaux have been most vigorously dissected into a labyrinth of branching spurs, a few tribes of warlike Indians still remain unsubdued. Where isolated mesas offer natural protection, several tribes of gentler nature have made their homes. Shallow caves under overhanging cliffs contain the abandoned stone dwellings of a people who probably chose these singular sites for the safety that they gave from attack. A few settlers are found in valleys or basins where water can be had to irrigate their fields. Some lumbermen have attacked the forests on certain of the volcanoes near a railroad line that crosses the desolate plateaux. Government surveyors have traversed and studied the region, and it would almost seem that the greatest gain to be derived from this almost uninhabitable country will be its teachings as to the origin of land-forms by wholesale denudation.

The Columbia Plateaux.—A great extent of country drained by the Columbia and Snake rivers in Idaho, Oregon, and Washington, is built up of vast lava sheets, which have converted a broad depression between the Rocky and the Cascade Mountains into an extensive plateau. The shore line of the lava flood may often be traced, entering the mountain valleys in level embayments, indented by the mountain spurs which advance into it like promontories. Isolated hills and mountains occasionally rise above the lava plain like outlying islands. The lava floods must have taken place at different dates; for while some are smooth, unweathered, and barren, as if very recent, others are more or less upheaved and dislocated, and dissected even by small streams. The Blue Mountains in south-eastern Washington are only an uplifted and deeply dissected part of the lava plateau; here the canyon of Snake River has a depth of 4,000 feet with intricately carved walls. At certain points the stream has laid bare some of the underlying mountains; one of these, composed of resistant quartzite, is cut down 2,500 feet by the river, although capped by 1,500 feet of bedded lavas. Elsewhere the dissection is of gentler nature; from every interstream swell of the surface a vast expanse of treeless undulations stretches away to a horizon almost as level as that of the sea. Gray sage brush is found everywhere; scattered tufts of grass suffice for ranging horses and cattle. Near the Rocky Mountains, where the rainfall is somewhat greater than over the centre of the plateau, there is a plentiful soil on the uplands, partly supplied by local weathering, partly wind-borne from further west; here is one of the newer wheat districts of the great interior country. Although the land is not at first sight inviting to the farmer, it repays his labour abundantly without the need of irrigation. *Spokane*, where two transcontinental railway lines come together, is the growing metropolis of this region.

One of the most remarkable features of the lava plateau is the former path of the Columbia river, known as the "Grand Coulée," carved when its northern détour was obstructed by ice streams that descended from the mountains on the north and west in the glacial period. Although now nearly dry, the Grand Coulée may be traced for over a hundred miles across the plateau; here narrow and deep-cut in the uplifted lava beds, there broader and shallower in a lower upland; generally with an even floor, but at one place broken by the cliffs of a former cataract that must have greatly exceeded Niagara in height, breadth and variety of form. The pools that were excavated by the plunge of the extinct cataract contain clear blue lakes, but the cliffs are dry and bare.

The Basin Ranges.—West of the Wahsatch Range and the Colorado plateaux, south of the Columbia plateaux, and east and south of the Sierra Nevada, there is an arid region embracing all of Nevada, part of Utah and Arizona and the south-eastern corner of California, and extending into Mexico. Only one important river, the Colorado, reaches the sea from this desert empire. Nearly all the scanty rainfall dries away in the dessicating atmosphere. The region is diversified by many independent mountain ranges of north and south trend and of varied structure. Some bear trees on their upper slopes; others are barren to their crests. In the north-west, adjoining the lava plains of Oregon, some of the ridges are notable for the very recent date of their uplift, their form being as yet hardly modified by erosion from the original shape of their tilted blocks. In the middle of the region the ridges are elaborately carved by valleys and branch valleys. In the south-west some of the ridges appear to be nearly worn away, only low residual knobs remaining.

The confluent depressions between the isolated ranges are floored with long piedmont slopes of stony and gravelly waste that has been washed from the mountain valleys. Two approaching slopes unite in forming an intermont trough whose floor may stand at altitudes of 4,000 or 6,000 feet in Utah and northern Nevada, thus rivalling the height of many plateaux; yet it differs from a typical plateau in the prevailing absence of valleys, for the waste slopes are built up by the streams that issue heavily charged with detritus from the mountain gorges. Thus the depressions are filling up while the mountains are wearing down. In the south-west the floor of the depressions is of moderate altitude; indeed, in south-eastern California the arid floor of the Coahuila desert descends 300 feet beneath sea-level. This depression represents the head of the Gulf of California, now isolated by the delta of the Colorado and evaporated to dryness. An outflowing branch or distributary of the Colorado occasionally turns northwards on the delta at times of high water, and flows into the desert basin, forming a short-lived lake. In south-western Arizona some of the gently inclined piedmont slopes are rock-floored, bearing only a thin veneer of waste here and there; the streams, issuing from the mountains after a shower, find no channels, but spread out in a sheet a mile or more broad and one or

two feet deep, washing the gravel veneers forward down the inclined rock floor; this peculiar style of drainage has been termed a "sheet flood."

Nearly all the streams from the mountains wither away on the dreary piedmont waste slopes. Sage brush is the prevailing vegetation; spiny yuccas and thorny cactus occur in the arid and warm south-west. The larger streams unite to form shallow salt lakes in the lowest part of the intermont troughs. Others form shallow water sheets, a few inches deep, in the wet season, where smooth plains of barren sun-baked mud, or "playas," remain in the dry months. There are few parts of the country less inviting to settlement than the region of the Basin Ranges, yet here, as on the Colorado plateaux, the scientific explorer has reaped a rich harvest. Comparable with the record of a past glacial climate in the region of the Laurentian lakes is the record of a past humid climate in the arid basins of Utah and Nevada. The basin of Great Salt Lake in Utah and that of several independent lakes in north-western Nevada each formerly held large lakes that rose nearly a thousand feet on the adjoining mountain flanks, and there marked their shore lines in cliffs, bars and deltas. The records have been deciphered and are elaborately described in monographs of the United States Geological Survey. No other ancient lake basins have been so well studied.

FIG. 366.—*The Ancient Beds of Lake Bonneville (in Utah) and Lake Lahontan (in Nevada). The Map measures 550 by 420 miles.*

People and Towns of the Basin Ranges.—The settlements of the Basin Range region may be grouped under three classes: the Mormons originally about Salt Lake in Utah, the mining towns in the mountains, and scattered ranches of Mormons and Gentiles, where streams can be used for irrigation. The Mormons exhibit in their polygamous and superstitious creed an example of religious atavism. Their converts have been gathered from the eastern United States and from western Europe. Their history includes many deeds of violence and cruelty, yet much may be said in their favour. Their settlements in Utah were established half a century ago without the intemperance of every kind that has characterised the frontier towns of those who would in a census be classed as "Christians." Their desert home has been transformed into a productive farming country by persevering industry and thrift. Polygamy, now formally abandoned, was never practised by more than 4 per cent. of the marriageable men; the Mormons should be classed as merely one more of the

many superstitious sects of the so-called civilised nations. *Salt Lake City* on the shore of the lake is the centre of Mormon activity.

The most famous mining town of the Basin Ranges is *Virginia City* in north-western Nevada. Many millions of gold and silver have been taken from the Comstock Lode, above which the city was built, and many other millions have been spent in efforts to prolong the life of the mines there opened. The discovery of the lode about 1860, at a time when the yield of gold in California was decreasing, caused the greatest "rush" known in the history of western mining. Thousands of persons hurried over the Sierra Nevada, in the hope of locating a paying claim; other thousands followed to open saloons, gambling resorts, and "opera houses," and thus, like parasites, to live upon the miners. The rapid growth of Virginia City and a few other mining "camps" was the excuse for the admission of Nevada as a State in 1864; a most unfortunate political necessity, for in spite of its enormous area, exceeding that of many eastern States combined, its population has fallen under 50,000, less than that of many cities of the second class. Virginia City is now reduced to a mere shadow of its short-lived greatness. The population of the State must always be scanty, scattered, and isolated.

THE PACIFIC SLOPE

The Pacific Ranges, broadly separated from the Rocky Mountains, include the lofty Sierra Nevada of California, the Cascade Mountains of Oregon and Washington, and several smaller coast ranges. The highest summits are in the granitic southern part of the Sierra Nevada, where Mount Whitney nearly reaches 15,000 feet. The Sierra is precipitous on the east, descending abruptly into the Basin Range region and shedding great slopes of stony waste, varied about Mono lake by superb moraines of extinct glaciers. The descent on the west is much more gradual; here many of the interstream highlands have the appearance of somewhat uneven inclined planes, separated by deep-cut canyons. All these features suggest that the range as a whole may be regarded as a huge block, uplifted on the east long enough ago to be deeply scored by the streams from its crest. Among the valleys the Yo-Semite is phenomenally deep, with precipitous walls of granite. The Hetch-hetchy valley is of similar form, but of smaller dimensions, a little further north. The range is crossed only by Pitt river, which rises on the western part of the Columbia plateau, trenches through the range and joins the Sacramento system. Great flows of lava and sheets of volcanic conglomerates lie on the western slope of the range about its middle, the date of their eruption being earlier than that of the valley cutting. Further north volcanic cones and recent lava flows become more abundant.

The higher summits of the Cascade Range are all volcanic cones, more or less dissected by radiating valleys, the chief being Mounts Rainier, St. Helens, and Hood. They bear heavy snowfields and glaciers. Mount

Shasta, in northern California, is an isolated volcano, west of the higher ranges, one of the most symmetrical and least dissected of the larger cones. Crater lake in southern Oregon occupies a huge caldera ; once a lofty cone, furrowed by radial valleys, the upper part has been removed by engulfment, leaving a great cavity, with precipitous inner walls, four miles in diameter and one mile deep. The lost summit of the cone has been christened Mount Mazama by a club of mountain climbers of that name, who have done much to make the caldera better known. The Columbia and Klamath rivers break through the mountains in deep gorges on their way from the lava plateaux to the sea.

The Coast Ranges are of moderate altitude, well dissected by numerous valleys, and frequently descending directly to the ocean shore in precipitous cliffs and headlands. Many signs of change of level are found in raised beaches and submerged valleys; but owing to the general parallelism of the ridges and the coast line, and to the absence of recent strong depression, the shore has few strong re-entrants. The range is not rich in metalliferous deposits, save at *New Almaden*, where there has been a large yield of mercury.

The broad troughs between the Coast Ranges and the higher mountains further inland are floored with waste from the mountain valleys. In California the waste-strewn floor makes a plain of great extent, the flat fans of detritus that are spread out before every mountain valley being admirably adapted to the distribution of water by irrigating canals. The intermont trough is much less distinctly developed on the path of the Klamath river, where the adjacent ranges approach one another in a node of irregular relief. Further north it reappears, and is partly occupied by the branching waters of Puget Sound. Here recent studies lead to the conclusion that the waste-built lowlands adjoining the sound are glacial or aqueo-glacial deposits, while the trunk and branches of the sound are the spaces once occupied by many confluent ice streams that came down from the mountains in the glacial period. The many degrees of latitude that are traversed in passing along the Pacific slope from the desert lowlands between the Basin Ranges of south-eastern California over the great valley of California to the forested valley of Puget Sound, explain the climatic contrasts between the arid and humid extremes of this belt. They resemble each other only in their relatively small seasonal changes, one being persistently warm and dry, the other persistently cool and wet.

People and Towns of the Pacific Coast.—The settlement of the Valley of California by Spanish Americans was well advanced before the discovery of gold caused the inrush of fortune-seekers from the eastern United States and Europe in 1849 and 1850. Spanish names still preponderate, as in *Sacramento*, the capital, *San Francisco*, the great Pacific port at the only break in the California coast range, *Los Angelos* and *San Diego* on the coast further south. The old Spanish mission churches are the only antiquities of the State having European associations. In those early days

cattle raising on the great valley plain was the main industry, and hides were the chief article of export. With the acquisition of the territory by the United States and the incursion of gold seekers, a new order of things was inaugurated; a rough and violent order at first when "vigilance committees" put their prompt measures in the place of the slower procedure of the law courts.

The newcomers made their way thither by long voyages in sailing ships round Cape Horn, by shorter voyages with a land passage across the malarial isthmus of Darien, and by a difficult and dangerous overland journey in white-covered waggons or "prairie-schooners." The hardships of the overland passage across plains, mountains, and desert basins, are long to be remembered; Indian ambuscade, thirst in the dry country, and cold storms in the Sierra overcame many a pioneer emigrant. The survivors are justly proud of their record as "'49-ers." Gold was taken from quartz veins in the metamorphic rocks of the lower Sierras, and from "placers" or gravel deposits in the foot hills; but in the ten years from 1850 to 1860 the great increase of population and the exhaustion of many mines and "diggings" turned attention to the fertility of the great valley plain, the cattle ranches were replaced by farms, and California became a great wheat-raising State. The second decade was marked by the construction of a trans-continental railroad, completed in 1866, and California then ceased to be a distant part of the Union. In later years the number of railroads across the continent (Fig. 336) has increased to five—not counting the Canadian Pacific Railway—each line now being largely dependent on carrying cattle and farm products by the way, as well as on through passengers and freights. Beautiful winter resorts attract thousands of people to the tempered Pacific coast from the violent climate of the interior. The irrigated plains of southern California are now occupied by extensive vineyards and fruit ranches, from which eastern markets are largely supplied. At the same time the more northern railroads have promoted the growth of *Portland*, *Tacoma*, and *Seattle* on the harbours of the far north-west; the great forests on the littoral slopes of Oregon and Washington are being sawed into lumber for the distant plains and prairies. The purchase of Alaska and more recently the discovery of the Klondike gold-field, has encouraged traffic along the north-western coast. Trans-Pacific commerce has in the meantime grown apace, and with it came an incursion of Chinamen, patient and industrious workers, living on

FIG. 367.—*The Site of San Francisco.*

a fraction of what would be required for an ambitious American, not making the United States their home, but hoping to return to China alive or dead ; a useful element in a country where serfdom prevailed, but not desirable citizens for a free republic. The manifest lesson to be drawn from the great intelligence and prosperity of the people in the north-eastern quarter of the United States is that all immigrants must make this country a permanent home for themselves and their children ; that they must accept the rights and duties of citizenship as well as the responsibility of self-support and self-improvement ; and that from the unified mass thus formed no barrier of race, religion or foreign fealty shall obstruct the rise of leaders, to guide the people in the further development of the United States.

Alaska.—The north-western extremity of North America, constituting the territory of Alaska, 580,000 square miles in area (about one-sixth of the area of United States) was bought from Russia for $7,200,000 in 1867. It has a small native population of various Indian tribes, and a growing white population bent on the development of its resources. The compact land body, approaching within 54 miles of Asia, and bounded on the east by the 141st meridian, has an arm 500 miles long extending south-east along the coast, and including a narrow strip of mainland as well as the countless islands of the Alexander Archipelago. *Sitka*, the territorial capital, is situated on Baranof Island in this group. There is a second arm, 1,500 miles in length, composed of the volcanic Aleutian Islands, looping across the northern Pacific from Alaska Peninsula towards Kamchatka. The coast line is extremely irregular on the south, measuring in total 18,000 miles, or more than that of all the United States.

The southern coast is bold and mountainous. Mount St. Elias, practically on the frontier at the base of the south-eastern arm, rises higher than 18,000 feet. The heavy snowfall forms immense glaciers, descending to the sea, the largest being the Malaspina glacier, fed by snow-fields on the St. Elias range. Muir glacier, further south-east, is annually visited by many tourists. The temperature on the mountain flanks is moderate and equable, favouring the growth of heavy forests along the coast as far as Kadiac Island, at the base of the Aleutian chain. The interior is little known, except along the course of the Yukon, one of the great rivers of the world. Its climate is drier than on the coast, and the seasonal changes of temperature are greater ; extreme cold is felt in winter, and the ground is frozen to a depth estimated at 100 feet. Here the vegetation is chiefly a dense cover of moss. On the north coast, far within the Arctic circle, layers of ice are seen beneath the surface soil.

The economic products of Alaska come at present chiefly from the seal fisheries of the Pribilof Islands (north of the Aleutian chain), and from the gold-fields of the Yukon valley and the coast of Bering Sea. The seals have been reduced from their originally countless numbers by too reckless destruction, but if their capture is properly restricted they must

yield a large revenue to the Government as well as a profit to the sealers for many years to come. Gold deposits of moderate value have been worked for about thirty years past at various points on the Alexander Archipelago. In the autumn of 1896 the Klondike field in the Canadian Yukon District was discovered, and when the news of its richness reached the United States in the following spring, there was a "rush" of would-be miners that recalls early Californian days.

Alaska is of especial interest as the first outlying territorial addition to the United States. Its purchase provoked much criticism, and even ridicule, yet as a financial investment it has been profitable. Its administration has been thus far comparatively simple, for its population has been far too small for any question to arise as to its accession to Statehood. Quite different political problems must arise in the more populous detached territories in a genial climate which have recently been brought under the sway of the United States.

STATISTICS.

AREA AND POPULATION OF THE UNITED STATES.

	Area.	Population.			Date of Admission.		
	sq. miles.	1880.	1890.	1900.	Territory.	State.	
Alabama	52,250	1,262,505	1,513,017	1,828,697	1817	1819	Ala.
Arizona	113,020	40,440	59,620	122,931	1863	—	Ariz
Arkansas	53,850	802,525	1,128,179	1,311,564	1819	1836	Ark.
California	158,360	864,694	1,208,130	1,485,053	—	1850	Cal.
Colorado	103,925	194,327	412,198	539,700	1861	1876	Col.
Connecticut	4,990	622,700	746,258	908,420	Original State.		Conn.
Delaware	2,360	146,608	168,493	184,735	„	„	Del.
District of Columbia	70	117,624	230,392	278,718	1791	—	D. C.
Florida	58,680	269,493	391,422	528,542	1822	1845	Fla.
Georgia	59,475	1,542,180	1,837,353	2,216,331	Original State.		Ga.
Idaho	81,800	32,610	84,385	161,772	1863	1890	Id.
Illinois	56,650	3,077,871	3,826,351	4,821,550	1809	1818	Ill.
Indiana	36,350	1,978,301	2,192,404	2,516,462	1800	1816	Ind.
Indian Territory	31,400	—	—	392,060	—	—	I. T.
Iowa	56,025	1,624,615	1,911,896	2,231,853	1838	1845	Iowa.
Kansas	82,080	990,096	1,427,096	1,470,495	1854	1861	Kans.
Kentucky	40,400	1,648,690	1,858,635	2,147,174	—	1792	Ky.
Louisiana	48,720	939,946	1,118,587	1,381,625	1805	1812	La.
Maine	33,040	648,936	661,086	694,466	—	1820	Me.
Maryland	12,210	934,943	1,042,390	1,188,044	Original State.		Md.
Massachusetts	8,315	1,783,085	2,238,943	2,805,346	„	„	Mass.
Michigan	58,915	1,636,937	2,093,889	2,420,982	1805	1837	Mich.
Minnesota	83,365	780,773	1,301,826	1,751,394	1849	1858	Minn.
Mississippi	46,810	1,131,597	1,289,600	1,551,270	1798	1817	Miss.
Missouri	69,415	2,168,380	2,679,184	3,106,665	1812	1821	Mo.
Montana	146,080	39,159	132,159	243,329	1864	1889	Mont.
Nebraska	77,510	452,402	1,058,910	1,066,300	1854	1867	Nebr.
Nevada	110,700	62,266	45,761[1]	42,335	1861	1864	Nev.
New Hampshire	9,305	346,991	376,530	411,588	Original State.		N. H.
New Jersey	8,175	1,131,116	1,444,933	1,883,669	„	„	N. J.
New Mexico	122,580	119,565	153,593	195,310	1850	—	N. M.
New York	49,220	5,082,871	5,997,853	7,268,894	Original State.		N. Y.
North Carolina	52,250	1,399,750	1,617,947	1,893,810	„	„	N. C.
North Dakota	70.795	135,177[2]	182,719	319,146	1861	1889	N. Dak.
Ohio	41,000	3,198,062	3,672,316	4,157,545	—	1802	O.
Oklahoma	39,030	—	61,834	398,331	1890	—	Ok. T.
Oregon	96,030	174,768	313,767	413,536	1848	1859	Ore.
Pennsylvania	45,215	4,282,891	5,258,014	6,302,115	Original State.		Pa.
Rhode Island	1,250	276,531	345,506	428,556	„	„	R. I.
South Carolina	30,570	995,577	1,151,149	1,340,316	„	„	S. C.

[1] Decrease.

[2] Including South Dakota.

AREA AND POPULATION OF THE UNITED STATES—(*continued*).

	Area. sq. miles.	Population. 1880.	1890.	1900.	Date of Admission. Territory.	State.	
South Dakota	77,650	See N. Dakota.	328,808	401,570	1861	1889	S. Dak.
Tennessee	42,050	1,542,359	1,767,518	2,020,616	—	1796	Tenn.
Texas	265,780	1,591,749	2,235,523	3,048,710	—	1845	Tex.
Utah	84,970	143,963	207,905	276,749	1850	1896	U.
Vermont..	9,565	332,286	332,422	343,641	—	1791	Vt
Virginia	42,450	1,512,565	1,655,980	1,854,184	Original State.		Va.
Washington	69,180	75,116	349,390	518,103	1853	1889	Wash.
West Virginia	24,780	618,457	762,794	958,800	—	1863	W. Va.
Wisconsin	56,040	1,315,497	1,686,880	2,069,042	1836	1848	Wis.
Wyoming	97,890	20,789	60,705	92,531	1868	1890	Wy.
United States ..	3,022,600	50,155,783	62,622,250	76,085,794			

POPULATION BY BIRTH.

	1890.	1900.		
England	909,092	.. ..	842,078	
Wales..	100,079	.. ..	93,682	
Scotland	242,231	.. ..	233,977	
Ireland	1,871,509	.. ..	1,618,567	
United Kingdom	.. ..	3,122,911	.. .. ..	2,788,304
Germany	.. ..	2,784,894	.. .. ..	2,666,990
Canada and Newfoundland	.. ..	980,938	.. .. ..	1,181,255
Sweden and Norway.. ..	.. ..	800,706	.. .. ..	910,025
Russia and Poland ..	.. ..	330,084	.. .. ..	807,606
Italy	.. ..	.. ..	—	.. .. ..	484,207
Austria-Hungary ..	.. ..	303,812	.. .. ..	579,042
China	.. ..	106,688	.. .. ..	81,827
Other Foreign Countries	.. ..	819,514	.. .. ..	857,388
Total Foreign Born ..	.. ..	.. ..	9,249,547	.. .. ..		10,356,644
Coloured, Native Born	.. ..	.. ..	7,470,040	.. .. ..		8,840,388
White, Native Born ..	.. ..	.. ..	45,902,663	.. .. ..		57,888,762
Total Population of United States (excluding Alaska)			62,622,250			77,085,794

POPULATION OF THE LARGER CITIES OF THE UNITED STATES.

	1890.	1900.		1890.	1900.
New York, N.Y. ..	1,515,301	3,437,202[1]	Worcester, Mass. ..	84,655	118,421
Chicago, Ill... ..	1,099,850	1,698,575	Syracuse, N.Y.	88,143	108,374
Philadelphia, Pa. ..	1,046,964	1,293,697	New Haven, Conn. ..	81,298	108,027
Brooklyn, N.Y. ..	806,343	—	Paterson, N.J.	78,347	105,171
St. Louis, Mo. ..	451,770	575,238	Fall River, Mass. ..	74,398	104,863
Boston, Mass. ..	448,477	560,892	St. Joseph, Mo.	52,324	102,979
Baltimore, Md. ..	434,439	508,957	Omaha, Neb.	140,452	102,555
Cleveland, O. ..	261,353	381,768	Los Angeles, Cal. ..	50,395	102,479
Buffalo, N.Y. ..	255,669	352,387	Memphis, Tenn... ..	64,495	102,320
San Francisco, Cal..	298,997	342,782	Scranton, Pa.	75,215	102,026
Cincinnati, O. ..	296,908	325,902	Lowell, Mass.	77,696	94,969
Pittsburg, Pa. ..	238,617	321,616	Albany, N.Y.	94,923	94,151
New Orleans, La. ..	242,039	287,104	Cambridge, Mass. ..	70,028	91,886
Detroit, Mich. ..	205,876	285,704	Portland, Ore.	46,385	90,426
Milwaukee, Wis. ..	204,468	285,315	Atlanta, Ga.	65,533	89,872
Washington, D.C. ..	230,392	278,718	Grand Rapids, Mich. ..	60,278	87,565
Newark, N.J. ..	181,830	246,070	Dayton, O.	61,220	85,333
Jersey City, N.J. ..	163,003	206,433	Richmond, Va.	81,388	85,050
Louisville, Ky. ..	161,129	204,731	Nashville, Tenn... ..	76,168	80,865
Minneapolis, Minn..	164,738	202,718	Seattle, Wash.	42,837	80,671
Providence, R.I. ..	132,146	175,597	Hartford, Conn... ..	53,230	79,850
Indianapolis, Ind. ..	105,436	169,164	Reading, Pa.	58,661	78,961
Kansas City, Mo. ..	132,716	163,752	Wilmington, Del. ..	81,431	76,508
St. Paul, Minn. ..	133,156	163,065	Camden, N.J.	58,313	75,935
Rochester, N.Y. ..	133,896	162,608	Trenton, N.Y.	57,458	73,307
Denver, Col... ..	106,713	133,859	Bridgeport, Conn. ..	48,866	70,996
Toledo, O.	81,434	131,822	Lynn, Mass.	55,727	68,513
Allegheny, Pa. ..	105,287	129,896	Lawrence, Mass. ..	44,654	62,559
Columbus, O. ..	88,150	125,560	Des Moines, Iowa ..	50,093	62,139

LAND UNDER CROPS IN 1901.

Crop ..	Indian Corn.	Wheat.	Oats.	Cotton.	Barley.	Potatoes.[2]
Acres ..	91,350,000	49,896,000	28,541,000	27,532,000	4,296,000	2,611,000

[1] Includes Brooklyn.

[2] In 1900.

CHIEF WHEAT-GROWING STATES, 1901.

State	Kansas.	Minnesota.	N. Dakota.	S. Dakota.	Nebraska.	United States.
Million bushels	99·1	80·1	59·3	51·7	42·0	748·5

CHIEF COTTON-GROWING STATES, 1899.

State	Texas.	Georgia.	Mississipi.	Alabama.	S. Carolina.	United States.
Bales of Raw Cotton	2,438,000	1,346,000	1,204,000	1,005,000	831,000	9,143,000

CHIEF MINERAL PRODUCTIONS IN 1901.

Product	Bituminous Coal.[1]	Anthracite.	Pig Iron.	Gold.	Silver.
Amount—tons	201,630,000	60,242,000	15,878,000[2]	—	—
Value—£	47,300,000	22,500,000	48,400,000	15,730,000	14,270,000

GROWTH OF RAILWAYS IN THE UNITED STATES.

Date	1830.	1850.	1870.	1890.	1900.
Miles open	23	9,021	52,922	169,698	194,334

ANNUAL TRADE OF UNITED STATES (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	115,600,000	133,400,000	157,000,000
Exports	97,200,000	154,900,000	174,500,000

DESTINATION AND ORIGIN OF FOREIGN TRADE.

(Percentage of total in 1896.)

Country.	Exports to.	Imports from.	Total Trade.
United Kingdom	46·3	23·1	36·4
Germany	12·1	14·5	13·1
France	5·4	8·9	6·8
British North America	5·7	5·3	5·6
Brazil	1·2	9·0	4·4
Netherlands	4·8	1·7	3·5
Belgium	3·1	1·7	2·6
Italy	2·1	2·5	2·2
Mexico	2·2	2·3	2·2
Japan	1·3	3·1	2·1
China	1·2	2·6	1·8
Other Countries	14·6	25·3	19·3
Total	100·0	100·0	100·0

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[1] For development of coal production (Anthracite and Bituminous) see curve in Fig. 70.
[2] In 1902 the production exceeded 17,800,000 tons.

CHAPTER XL.—MEXICO

By Angelo Heilprin,
Professor of Geology, Academy of Natural Sciences of Philadelphia.

Position and Extent.—The Republic of Mexico (Spanish, *Méjico*), which bounds the United States on the south, lies between latitudes 32½° and 14½° N., and the meridians 86½° and 117° W. of Greenwich. In its north and south extent it thus lies almost equally within and without the tropics. The boundary line with the United States, which was determined by treaties in 1848 and 1853, has a length of 1,833 miles, of which 1,136 are constituted by the Rio Grande, from the mouth of that stream in the Gulf of Mexico upwards. The boundary with Guatemala, which was finally adjusted by treaty in 1895, fixes the southern point of the republic almost at the mouth of the Zuchiate river. The area of the country, inclusive of a few small outlying islands, is some 767,000 square miles, or approximately three times that of Austria-Hungary. Mexico has two peninsular parts—the peninsula of Lower California (officially, *Baja California*) and Yucatan, the latter properly comprising the two States of Yucatan and Campeche. The great Gulf of California, which separates the main mass of the republic from Lower California and receives at its northern extremity the Colorado River from the United States, occupies seemingly the position of a sunken block of the Earth's crust which broke continuity between what is now the peninsular apex and the protruding coastline of the State of Jalisco.

Configuration.—Mexico is pre-eminently a region of mountain elevations, but this is not always to be recognised in the interior on account of the development of a broad elevated tableland whose flat or gently undulating surface, rising from the depression of the Rio Grande to graduated altitudes of 6,000, 7,000, and 8,000 feet, or even more, masks the configuration of the land. Much of this plateau has been formed through a progressive and long-continued accumulation of detrital material, representing in part the distributed products resulting from mountain destruction and in greater part the discharges from an almost endless number of volcanic openings. These have, as it were, filled the original valleys to their lips, and it is thus upon the new surface that the more recent or existing valleys have been imposed. In this conception, the great central plateau of Mexico is not of tectonic construction, but merely a filled-up series of troughs, not wholly unlike the snow-accumulated tableland of Greenland, through whose margins alone the buried moun-

tains protrude their summit-peaks. In Mexico, too, especially in the loftier parts of the plateau, buried mountains rear their summits as "islands" above the enveloping mass; elsewhere they make continuous ridges or chains, whose crest-lines may be as much as 10,000 feet above the sea. The east and west flanks of the plateau clearly reveal their mountain origin, and in their sudden plunge to the lowlands the Sierra Madre Oriental and the Sierra Madre Occidental—as the two main lines of bulwarks and their ramifications are vaguely designated—present some of the most marked physical features, and at the same time some of the sublimest views of nature, that are to be met with on the Earth's surface. What relation the Mexican Cordilleras bear to the main Rocky Mountain system of North America has not yet been definitely determined, but that they do not constitute that integral part which was at one time assumed, is certain; and it remains for further investigation to ascertain the relationship, if any such exists, with the South American Andes.

Volcanoes.—The volcanoes of Mexico are very numerous, and they constitute the highest relief of the land. The loftiest of these are: Citlaltepetl, the "Star Mountain"—commonly known as the Peak of Orizaba—(18,250 feet), ranking, with the possible exception of Mount Logan, as the highest summit of the North American continent; Popocatepetl, the "Smoking Mountain" (17,520 feet); Ixtaccihuatl, the "White Woman" (16,960 feet); Nevado de Toluca (14,950 feet); Malinche (Matlalcueyatl, 13,460 feet); Cofre de Perote (Nauhcampatepetl, 13,400 feet); Nevado de Colima (14,210 feet); Volcan de Colima (12,990 feet); Cerro de Apisco (12,700 feet); and Tancitaro (12,650 feet). The first two of these, both resting with one foot on the plateau, might properly be considered as dormant cones, since they continue to exhale from perfectly preserved craters aqueous and sulphurous vapours; they are amongst the most beautifully formed of volcanic mountains. Ixtaccihuatl is manifestly a broken-down and dismantled volcano, having to-day the contour of some of the silenced volcanic peaks of the equatorial Andes, such as Antisana; similar wrecks are the Nevado de Toluca (in whose crater is one of the most elevated lakes of the globe) and the Cofre de Perote. Colima is the most active volcano of the land, its eruptions having been almost unremitting for many years. Its position off the plateau, on the Pacific slope, allies it with Jorullo—a mountain of only Vesuvian proportions, made famous by Humboldt's recital of its terrific constructive eruption of 1759–63. Heated columns of air, with a temperature of 167° F., still rise from the crater-walls of this forest-clad mountain. Some efforts have been made by geographers and geologists to prove that the principal volcanic cones are situated on one or more main lines of fissure which traverse the region in an extended east and west course; and it has even been contended that the southern edge of the plateau was coincident with one of these lines, but this still remains to be demonstrated. The snow-line in the region of the higher summits being found but little below 15,000 feet, only three

of the peaks—Orizaba, Popocatepetl, and Ixtaccihuatl—are perpetually snow-clad, although the names of two other summits—Nevado de Toluca and Nevado de Colima—signify ice-mountain. The writer has seen the Nevado de Toluca entirely destitute of either snow or ice. Only on Ixtaccihuatl does the ice-cap acquire a development sufficient to form true glaciers.

Rivers and Lakes.—Mexico is singularly deficient in large permanent streams, and the Mexican rivers offer but little opportunity to navigation. Apart from the Rio Grande, which at times becomes almost dry between El Paso and Presidio del Norte in consequence of irrigation tappings in New Mexico, the most important waterways are the Rio Conchos in the north, the Rio Lerma, or Santiago, and Rio de las Balsas (Mescala)—both flowing to the Pacific—in the south, and the Grijalva and Usumacinta, in the State of Chiapas, east of the isthmus of Tehuantepec. About fifteen miles from the city of Guadalajara the Lerma is precipitated over the magnificent fall of Juanacatlan, the "Niagara of Mexico." Nearly all parts of the country are gashed by deep troughs or excavated water-channels (*barrancas*), many of which are waterless during the dry season; but, after the rains, are wild with the tumult of tumbling waters, to whose revivifying influence a luxurious vegetation responds.

There are no really large lakes in the republic, that of Chapla on the Lerma, in the state of Jalisco, being the largest; but Cuitzeo and Patzcuaro, in the State of Michoacan, are extremely picturesque. Six lacustrine basins, covering considerable area, but with very insignificant depth, occupy much of the valley of the City of Mexico, or the true plain of Anahuac, but their waters are merely relics of the much larger extent which they formerly occupied. At the time of the Spanish conquest, the City of Mexico was a city of islands, being completely surrounded by the waters of Lake Texcoco. At the time of Humboldt's visit the western borders of that lake occupied a position about one mile to the eastward of the city limits; now, except in time of floods, this distance is about doubled. The depth of water in the lake at the present day, under normal conditions, hardly exceeds two feet over a large part of its area. The Mexican capital has at various times been inundated by the flooding of these lakes, and on account of the sewage of the city discharging into a lake without outlet epidemic malarial and gastric fevers have been common, and their ravages have only been checked by the benefits of a climate of 7,000 feet elevation. As it is, the death-rate

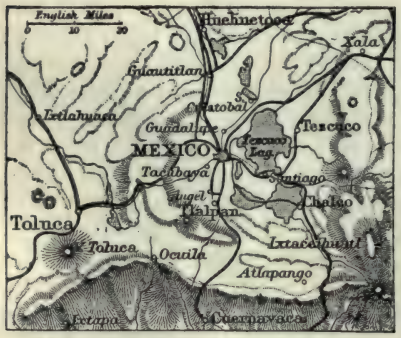

FIG. 368.—*The Valley of Mexico.*

in the Mexican capital, 40 per 1,000, is the highest of any city in the civilised world. The problem of drainage has thus become so serious that the greatest drainage system and one of the most remarkable engineering enterprises in the world was commenced in 1866 and completed in 1898. This *desague*, as the work is called, comprises a canal forty-three miles in length and a tunnel somewhat exceeding six miles, the latter discharging into the valley of Tequixquiac, due north of Lake Zumpango.

Climate.—The tropical position of Mexico, combined with its high elevation, necessarily ensures to the land a variety of climatic conditions. What is ordinarily considered to be a stifling tropical temperature characterises the lowland region—at least, its southern half—for the greater part of the year, the maximum temperature at Mérida (Yucatan), Mazatlan, and Colima, not infrequently reaches 105° F. Ordinarily the summer heat is not more oppressive than in the southern or central United States, and along the immediate ocean border it is tempered by indraughts of cool sea-air. Over the greater part of the plateau-surface a mild temperate climate prevails, the temperature in summer rarely rising above 88° or 90°, or in winter falling much below the freezing point. Snow in the Mexican capital is an extreme rarity, but it is not absolutely unknown.

In a general way the Mexicans recognise three superimposed zones of climate : the hot zone, or *tierra caliente*, extending from sea-level to about 3,000 feet of elevation ; the temperate zone, *tierra templada*, between 3,000 and 5,000 feet ; and the cold zone, *tierra fria*, comprising the land above 7,000 feet. Manifestly this zonal distribution of climate, in a region whose meridianal extent is upwards of 1,200 miles, differs considerably for the northern and southern sections of the country. Two well-marked seasonal conditions characterise much or most of the region. The rainy season, which occurs between May or June and October or November, brings joy to the landscape of Mexico, when the slumbering forces of vegetable and animal nature are again called into activity. During the height of the rainy season torrential rain falls almost daily, especially between the hours from two to four in the afternoon. In the dry season little or no rain falls. The highest rainfall appears to be at about Monterey, in the State of Nuevo Leon, where an annual average of about 130 inches has been established ; in the region about the City of Mexico, which represents the conditions of a large part of the plateau, the annual precipitation is about 25 inches. At Jalapa, situated (at an elevation of 4,400 feet) on the coastal slope of the Gulf of Mexico, the number of rainy days per year has been known to exceed 200. The conditions of rainfall throughout much of the land have unquestionably been greatly modified since the period of the Spanish conquest, as a result of extensive deforestation.

Flora and Fauna.—The Mexican flora naturally combines most diverse features. Dense and exuberant tropical jungles cover much of the low-lying tracts and the basal 2,000 to 3,000 feet of the mountain declivities. The forest is still in greater part virgin, and access to it

is obtained chiefly along the highways and the different waterways that irregularly thread through it. Among the dominant arboreal types of this tract may be mentioned the palms, figs (rubber-trees), cæsalpinias, and other acacias, the rosewood, and mahogany; the huge fig-trees are especially remarkable with their buttressed trunks. Hardly less imposing are the giant mangroves at various points on the coast of Yucatan. The zone between 4,500 and 6,000 feet, characterised by a superb growth of evergreen oaks, of melastomas, and in its lower part of an almost bewildering variety of orchidaceous plants, may be said to constitute the transition tract between the distinctively tropical and temperate floras; above, it is succeeded by the ordinary types of oaks and by the pine, spruce and fir among conifers. The latter ascend the high volcanoes to about 13,000 feet, forming magnificent forests at elevations of 9,000 to 10,000 feet. The "zones of vegetation," so called, can be made out with fair regularity, but the overlaps are remarkable for their vertical displacements. Thus, on the limestone ridges of the Yautepec, south of the central plateau, palms grow luxuriantly up to 7,500 feet; per contra, the pine is not infrequently met with down to an elevation of 3,000 feet or less. The most striking exhibitions of cactus growth—in which Mexico stands pre-eminent—are found on the lower plains of Yucatan and in the arboreal masses, which, at an elevation of some 6,000 feet, clothe the mountains south of Tehuacan.

Mexico enjoys a wealth of tropical and subtropical fruits, such as the orange, pine-apple, banana, coco-nut, pomegranate, anona, sapote, mango, and papaw, and loses correspondingly in the quality or flavour of most fruits of temperate climes. Among the special products of cultivation, indigenous or introduced, are the sugar-cane, cacao, coffee, vanilla, and agave, or American aloe. The last named, in Yucatan chiefly, furnishes the sisal hemp or fibre, while in major Mexico, an allied species yields the fermented national beverage known as *pulque*—the curse of beggardom, and the wealth of the endless *pulquerias* where it is sold.

The fauna of Mexico is necessarily a mixture of the faunas of South America and of the United States, the lowlands representing the elements of the former and the highlands of the latter. Zoogeographically it is a transition tract. The larger or more distinctive quadrupeds include the tapir, jaguar (*tigre*, with a range extending nearly or quite to the Texan frontier), ocelot, puma or cougar, coyote (prairie-wolf), peccary (ranging to Arkansas), ant-eater, and armadillo. Several species of monkey find a congenial home southward of the 19th parallel, but at least one form, as in the *sapotales* or sapote forests of the northern coast of Yucatan, reaches the 21st parallel. The birds are of great variety. Standing at the edge of the great plateau the traveller may be beguiled by the tones of the robin or mocking-bird, and three hours later by foot-walk his feathered companions will be the toucan, chattering parrots, the humming-bird, and cassique, or hangnest. Alligators, and perhaps even the American crocodile, are abundant in some of the lowland streams, as well as in bays and estuaries, and ordinarily they

are much more in evidence than the ophidians, large and small, which belong to the forest tract. Non-venomous water-snakes are singularly numerous in some of the plateau lakes. As special faunal elements should be mentioned the remarkable tailed amphibian axolotl, and from among insects, the travelling or foraging ants and nest-constructing termites.

People.—The inhabitants of Mexico resolve themselves into three categories : native Indians, of some 40 to 50 tribes ; Spaniards, or the descendants of the conquerors of Mexico, together with representatives of other European races ; and the mixed people resulting from a union of these two, who are often spoken of simply as *Mexicans*. Probably about 19 per cent. of the people are of European descent, 38 per cent. are native Indians, and 43 per cent. mixed races (Mexicans). It would appear that the native population has been steadily decreasing since the beginning of the nineteenth century. The Mexican Indians, with certain exceptions (Apaches, Comanches, Seris), are of a less warlike disposition than the Indians of the farther north, and, on the whole, may be said to be a hard-working, moral, and sober people, distinctly inclined to the arts of peace. Little or no prejudice exists against them as a race, and where by station or education they have advanced to a special grade of civilisation, they are accepted in marriage among the highest families of Spanish blood. They are kindly, courteous and dignified in mien and disposition, easily recognising the position which they occupy, and law-abiding to a most generous extent.

FIG. 369.—*Average population of a square mile of Mexico.*

The most important of the hundred modern languages of Mexico are the Mexican (Nahuatl Aztec), Comanche - Shoshone, Mixteco - Zapoteca, Maya-Quiché and Otomi. The Nahua tribe of the *Mexica* (Mexicans) derives its name from *Mexitl*, a word of obscure origin and meaning, but often assumed to be synonymous with Huitzilopochtli, the Mexican God of War. That Mexica and Azteca (the people from Aztlan, "the land of the white heron") define the same people—a people migrating in from the north—admits of no doubt ; hence, we may assume that Mexicans and Aztecs (including the Toltecs, who appear to have been only Mexicans from the region about Tula, and not an earlier independent migratory horde) represent in part the people who were ruled by the various kings and monarchs styled Motecuzoma, Moctezuma or Montezuma.

To what period of construction belong the monumental ruins that are scattered through southern Mexico—in Uxmal and Chichen-Itza in Yucatan, of Palenque in the State of Chiapas, or of Mitla in the State of Oaxaca—still remains to be determined, although recent research does not seem to demand an antiquity exceeding 700 to 1,000 years.

History and Government.—When conquered by Cortez in 1521 Mexico was called the Province of New Spain : it remained a

dependency of the Spanish crown for precisely three centuries, and was ruled successively by Governors, Audencias, and Viceroys. On September 27, 1821, the Spanish power in Mexico finally terminated, after a struggle of eleven years. An Empire was proclaimed early in 1822; but this was followed by the proclamation of a Republican Constitution in 1824. A generally stormy period led up to the war with the United States (April, 1846, to September, 1847). After some determined resistance on the part of the Mexicans, Maximilian, Archduke of Austria, as the representative of Napoleon III. of France, was placed upon the throne of Mexico in 1864, and thus was constituted the second Empire. After the fall of the empire and the execution of the emperor in 1867 the Republic was re-established and became prosperous.

FIG. 370.—*Mexican Flag.*

Mexico is now organised as a Federal Republic, composed of twenty-seven States, two territories, and one federal district, whose political organisation is almost identical with that of the United States. The powers of the government are vested in the Legislative, Executive, and Judicial bodies, the first-named consisting of a House of Representatives and of a Senate, representation in which is brought about by the suffrages of the people. The Executive or President is elected by electors popularly chosen and holds office for four years; there is no provision forbidding re-election.

Industries.—Mexico is one of the richest mining countries of the world, her mineral resources, which are as yet only partially developed, comprising gold, silver, platinum, copper, lead, iron and mercury. The annual output of silver is now claimed to be in value nearly £12,000,000, and of gold about £1,000,000. The main silver mines are comprised in the mining districts of Guanajuato, Zacatecas, and Catorce. An extensive industry is carried on in opals (principally from the region of Querétaro), and in the so-called "Mexican onyx," a beautifully shaded stalagmitic calcite which occurs in interbedded layers in the State of Puebla.

There are extensive manufactures of cotton and woollen goods (cloths, blankets, shawls), of leather (saddles and accessory trappings, shoes), and of felt and straw (hats); the pottery of Guadalajara is famous.

The cultivation of coffee is destined to become one of the foremost industries of the land, the lower tracts of the *tierra caliente* being particularly favourable to its growth. The coffee of Cordoba ranks but little inferior to the best coffee of the New World. Agriculture, although extensively practised, has in many districts hardly passed a primitive or experimental stage, and it is no uncommon thing to see the ancient forked or hooked stick serving for the plough-share. An equally primitive condition of the roadways and of transportation equipments prevails, transport over large areas being still almost exclusively by donkeys. During late years there has been an astonishing development of railroad enterprises, the length of roads operated by steam being, in 1901, over 9,500 miles. Two trunk

lines—the Mexican Central and the Mexican National—connect the City of Mexico with the United States frontier. The Mexican Railway, connecting the capital with Vera Cruz, was officially opened in 1873, and remains one of the most remarkable pieces of railroad construction.

Towns.—*Mexico* (Fig. 368), the ancient Tenochtitlan, capital of the Federal District and of the Republic of Mexico, is situated at an elevation of 7,350 feet above the sea-level. It combines the sumptuousness of a little Paris with the beggardom of Naples, the activity of a city of the north with the full inactivity of cities of the south. Here was established, in 1536, the pioneer printing-press of America, and, in 1693, the first newspaper (*Mercurio Volante*) of the New World. Schools, colleges, hospitals, and asylums flourish in abundance. The National Museum contains a most important collection of American antiquities—a treasure-house to the archæologist and ethnologist. The School of Fine Arts, or Academy of San Carlos, occupies the site where Fray Pedro de Gante, in 1524, founded the first school in the New World. The architectural features of the city are predominantly Spanish, the "palaces" of the wealthier classes down to the dingy shops of the poorer tradespeople, together with the arcades, municipal buildings, and churches, having fully accepted the controlling lines of Old Spain. The most striking edifice is the cathedral, the largest and most sumptuous church of America, erected on the site of the pyramidal temple of the titular god of the Aztecs.

The most important ports or harbours of Mexico are, on the Pacific side, Mazatlan, San Blas, Manzanillo, and Acapulco; and, on the Gulf coast, Tampico, Vera Cruz, Coatzacoalcos, Campeche, and Progreso (the last two in Yucatan). *Acapulco* has been described as the most beautiful Pacific port of all America, and, after Sydney, the finest harbour in the world. *Vera Cruz*, which has so long held supremacy as the eastern port, is destined to be supplanted by *Tampico*, the open coral-reef waters, in their exposure to the sudden and powerful north winds (*el Norte*), being unsuited for protracted anchorage.

STATISTICS.

	1879.	1900.
Area of Mexico in square miles	767,005	767,005
Population of Mexico	9,908,011	13,545,462
Density of population per square mile	13	18

Population of—	1879.	1900.	Population of—	1900.
Mexico City	241,110	344,721	Guadalajara	101,208
Puebla	68,634	93,521	Monterey	62,266
Leon	—	58,426	San Luis Potosi	61,019

ANNUAL TRADE (*in pounds sterling*).

	Average 1871–75.	1881–85.	1891–95.
Imports	5,500,000	6,170,000	7,600,000
Exports	5,000,000	6,830,000	7,500,000

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BOOK V.:
CENTRAL AND SOUTH AMERICA

CHAPTER XLI.—CENTRAL AMERICA

By Dr. Carl Sapper,
Coban.

Central America.—The Central American republics—Guatemala, Salvador, Honduras, Nicaragua, Costa Rica—and the colony of British Honduras, occupy the greater part of the area of the land bridge between the North and the South American continents. They are bounded

FIG. 371.—*Central America.*

on the north by the republic of Mexico, and on the south by the Colombian State of Panama, and lie between the Pacific Ocean and the Caribbean or Antillian Sea of the Atlantic. Both coasts are fairly uniform, forming only a few large bays, the Gulf of Honduras or Bay

of Amatique on the Caribbean, and the smaller gulfs of Fonseco, Nicoya, and Golfo Dulce on the Pacific side.

Orography and Geology.—Central America is very mountainous, the greatest heights occurring among the mountains of Guatemala and Costa Rica, while the ranges between them are only of moderate elevation. The beautiful cones of numerous volcanoes rise in a long, broken row near the Pacific coast; only where the land narrows in Costa Rica do they stretch across to the Atlantic side. The soft volcanic ashes which have accumulated are of great importance, forming plains in the mountain region, and, together with river deposits, along the coasts, where they materially increase the fertility of the soil. In the neighbourhood of the volcanic belt earthquakes are common and sometimes very severe, as the frequent destruction of towns testifies. Amongst the specially memorable catastrophes are those of Guatemala in 1773 and 1902, of San Salvador in 1854 and 1873, of Jucuapa (Salvador) in 1878, of Cartago (Costa Rica) in 1841 and 1851, of Rivas (Nicaragua) in 1844, and of Leon (Nicaragua) in 1609. Earthquakes are rarer and less severe in the non-volcanic districts and least frequent on the Atlantic coast. They are very rarely felt in British Honduras.

Surface of Guatemala.—In the northern republic of Guatemala it is easy to distinguish three orographic zones, the northern hilly plain of Peten, merging into the southern hilly district and northern plain of British Honduras; then the mountain chain of Central Guatemala, which attains heights of 12,500 feet, and the massive range of South Guatemala, which reaches 11,900 feet in Cerro Cotzic, and is continued towards the east into Honduras and Salvador. On the southern ridge of the last-named range numerous volcanoes rise, the highest, as determined by the triangulations of the inter-continental railway commission in 1892, are Tajumulco, 13,814 feet, Tacana, 13,334 feet, and Acatenango, 12,992 feet. The Pacific coast plain stretches at the foot of the volcanoes. The plain of Peten is composed for the most part of horizontally stratified recent Tertiary limestones. The northern chain of the Central Guatemala system, which appears to have been upheaved in middle Tertiary times, is composed of strongly folded and up-tilted early Tertiary and Mesozoic strata including an Upper Cretaceous limestone, which plays a large part. The middle chain is Palæozoic, including schists and Carboniferous limestones, and both chains are broken through by the transverse valley of the Rio Chixoy. The southern chain (Sierra de Las Minas and Del Mico) is of Archæan formation, principally mica-schist. Outbursts of granite, diorite, and serpentine pierce these ancient rocks. The cordillera in southern Guatemala is built up of recent eruptive rocks, partly andesite and partly basalt. Most of the volcanoes of Guatemala are extinct; during historic times eruptions have, however, been recorded of Tacana, Cerro Quemado, Fuego and Pacaya.

Surface of Salvador.—In the republic of Salvador the mountain

chains of recent eruptive rocks rarely exceed 5,000 feet in height, and are broken through by the transverse valley of the Rio Lempa. Steep-sided spurs of the Honduras Mountains in the north are separated from one another by deep-cut river valleys. The Pacific coast plain is rather narrow, and the main mountain ridge behind it contains most of the volcanoes, none of which reach 8,000 feet. During historical times the volcanoes Santa Ana, Quezaltepeque, San Miguel, Conchagua, and Conchaguita, have been active ; Izalco was formed in 1793 and has since been continually in eruption ; on the other hand, a new volcano which appeared in Lake Ilopango in 1880, has since nearly disappeared. The mountains of this republic have on the whole been little explored.

Surface of Honduras.—In the south of Honduras the mountains of recent eruptive rock are separated into different groups by deeply-trenched valleys, and some considerable depressions of the crest. In northern Honduras the mountains present the appearance of a chain, although eruptive flows play a considerable part in their structure : quartz porphyry in the southern, Mesozoic and granite in the northern, chain of Archæan rock. The latter reaches its greatest height in Congrehoy Peak, 8,040 feet. The mountainous Bay Islands, Roatan, Utila, and Bonaca are remnants of a former parallel chain. There are almost no volcanoes in Honduras except the extinct volcanic islands in the Gulf of Fonseca on the Pacific.

Surface of Nicaragua.—A great alluvial plain, similar to that of British Honduras, stretches along the Atlantic coast of Nicaragua, and behind it the extensive highlands of Segovia, Matagalpa and Chontales, composed of Palæozoic and Mesozoic strata with granite and basalt intrusions, reaches a maximum height of 7,000 feet. Beyond it there is a broad and remarkable depression occupied by the Gulf of Fonseca in the north, and further south by the great lakes of Managua and Nicaragua and the valley of their effluent, the San Juan river. On the west this depression is bordered by the low mountains of the coast cordillera. Numerous volcanoes rise from the volcanic ashes and tuffs with which the depression is covered, and many of them are active. Omotepe, on an island in Lake Nicaragua, is one of these, and the eruption of Coseguina in 1835 is famous as one of the most tremendous and disastrous known to history.

Surface of Costa Rica.—Two parallel mountain ranges run through Costa Rica, separated by the depression of Cartago ; on the northern range there are several active volcanoes, two of which, Turrialba and Irazu, exceed 11,000 feet in height. The southern chain has also numerous lofty mountains, but its highest peak (the volcano Chiriqui, 10,150 feet) lies beyond the southern border. The geological formations are similar to those of Nicaragua.

Hydrography.—The rivers of Central America flow partly to the Atlantic Ocean and partly to the Pacific, but a few find their way into

lakes which have no outlet. The main watershed runs near the Pacific coast and thus the rivers entering the Atlantic are longer, and some of them are navigable in places for light-draught boats. It was proposed (before the United States took up the Panama Canal) to utilise the San Juan river flowing from Lake Nicaragua to the Caribbean Sea in the formation of a ship canal, to join the two oceans through the great lake. The Usumacinta and its chief tributaries, the Chixoy and Rio de la Pasion in northern Guatemala are navigable, but rapids on the border of the Mexican province of Tabasco interrupt communication with the sea. There are numerous lakes, chief amongst them the great Lake Nicaragua, with an area of over 3,000 square miles, and Lake Managua, which discharges into it. Lake Yzabal (Golfo Dulce) in Guatemala and the numerous very beautiful mountain tarns and crater-lakes in most parts of Central America are distinctive features. Lakes without outlet are common in the limestone region of northern Guatemala, the largest being Lake Peten ; in the rainy season many shallow temporary lakes (*Akalches*) are formed in the hollows of the same region. Numerous lagoons of brackish water occur along both coasts.

Climate.—Central America lying completely within the tropics in 8° to 18° N., where the trade winds prevail, the climate would necessarily be damp and hot were it not for the prominent mountain system, which influences both temperature and rainfall. While the mean annual temperature on the coast is about 80° F., in Quezaltenango, at an elevation of 7,700 feet, it is only 58°. The annual range is comparatively small ; the average temperature of the coolest month, December or January, is only from 6° to 12° below that of the hottest month, April or May. The direction and extent of the mountain ranges exercise the principal influence on the atmospheric humidity and rainfall. Where the east or north-east trades blow, the slopes facing the Atlantic are moister than those of the Pacific ; on the latter coast only the southern slopes of the highest elevations in Guatemala extract a heavy rainfall from the sea breezes. The driest regions are those which are protected by mountain ranges from both oceans. All Central America is subject to numerous thunderstorms during the summer rainy season (*Invierno*), which reach a maximum shortly after each solstice. On the Atlantic coast the summer rainy season passes gradually into the trade wind rains, characterised by a minimum of thunderstorms but many rain showers of long duration, and leading to a winter rainy season with moderate precipitation, from February to April. On the Pacific slope a dry period (*Verano*) prevails from November to May. As an example of the influence of mountains on the distribution of rainfall it may be mentioned that the annual fall at Tual on the northern slope of the Central Guatemalan Chain (2,700 feet) is about 195 inches, in Coban on the top of the mountains (4,300 feet) 100 inches, and in Salama (3,050 feet) on the dry inland district of central Guatemala only 27 inches ; while in Guatemala city (4,850 feet) on the crest of the Southern

Cordillera the rainfall is 57 inches. The zone of maximum rainfall lies between 2,000 and 3,500 feet in elevation, above that precipitation often assumes the form of mist, and at heights above 10,000 feet, of snow.

Flora and Fauna.—Corresponding to the climate, the moist Atlantic side of Central America is covered with luxuriant primeval forest, which in the interior is rich in valuable wood, including mahogany and logwood, as well as in palms, creepers, and in the higher parts, tree-ferns, and epiphyte orchids. On the high mountains, oaks, alders, pines and cypresses are found. In the dry parts of the interior of the Pacific slope thin pine and oak woods cover the mountains, while the plains form grassy savannas diversified by thorny bushes. The driest parts of all are characterised by succulent plants such as the agave. On the Atlantic coast extensive deposits of sand are covered with grass and scattered pine trees, and known as Pine Ridges in British Honduras and on the Mosquito coast. According to the temperature there are three distinct floral zones. (1) *Tierra Caliente*, or hot land up to 2,000 feet, the principal zone of cacao cultivation, of the india-rubber and mahogany trees and of the coco-nut palm. (2) *Tierra Templada*, or temperate land from 2,000 to 6,000 feet, containing the principal belt of coffee cultivation. (3) *Tierra Fria*, or cold land above 6,000 feet, the principal grain and potato growing region. Cultivation stops at 10,500 feet, and forests at 12,500.

Animal life is also richer and more varied in the moist than in the dry regions. The principal mammals of Central America are the jaguar, the cougar, and smaller felidæ, wild swine, deer, monkeys, squirrels, and opossums. Bird-life is particularly rich, and the most beautiful bird of Central America, perhaps of the whole Earth, is the quetzal, which is limited to the forests of the moist and cool region. Snakes, some of them very poisonous, abound in the moist and hot region. Alligators and turtles are found in the waters of the hot land, and everywhere insect life is superabundant.

People and History.—In contrast with the luxuriance of plant and animal life in the moist, warm region, the human inhabitants flourish in the drier parts, where agriculture presents fewest difficulties and the conditions of health are favourable. The hot forest districts are very thinly peopled or even uninhabited, while a considerable density of population is found in the driest parts of the country. The prevalence of malaria in the low ground, both moist and dry, leads similarly to a concentration of population on the highlands, which are free from malarial fevers. Human habitations are found as high as 10,500 feet, but above that level the mountain slopes are uninhabited. On the low, hot plains of Peten, in Guatemala, there is only one person to two square miles, while in the high department of Totonicapan the density of population is 285 to the square mile.

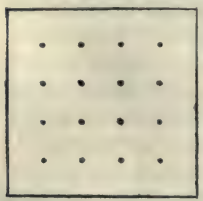

FIG. 372.—*Average population of a square mile of Central America.*

The aboriginal inhabitants at the beginning of the sixteenth century were much more numerous than now, and were divided into many small tribes, always at war with one another. The only considerable kingdom was that of the Quiché, which had already begun to decline when some of the rebellious vassals of the Quiché king sought the aid of the Spaniards against their sovereign. Craftily taking advantage of the disunion amongst the Indian tribes Pedro de Alvarado, in 1524 and 1525, took possession of the greater part of Guatemala and Salvador with a handful of Spaniards, whose horses and firearms were objects of peculiar terror. Some years later the Verapaz district was peacefully brought under Spanish control through Fray Bartolome de las Casas, the famous historian of the Spanish conquest of America. Costa Rica was occupied by the Spaniards from Panama in 1522, and Honduras was taken in 1523. Cortez himself made an extremely difficult campaign through northern Guatemala and into Honduras in 1524–25. The agricultural native tribes of Guatemala, who were in possession of an old and highly developed culture and possessed organised government, were easily overcome in war, but so stubbornly did they resist the introduction of new ideas and customs, that to the present day a large number of them have remained free from intermixture and preserved their ancient language. The other Indian tribes, who stoutly resisted the Spaniards in arms, were gradually overcome or absorbed, and thus it happens that over 880,000 aboriginal Indians now live in Guatemala, while only 70,000 exist in the rest of Central America. The number of Indian languages now spoken is about thirty, but most of the Indians also speak Spanish. The majority of the population now consists of Spanish-speaking Ladinos or Mestizos, *i.e.*, offspring of Europeans and Indians. There are perhaps 30,000 Whites, Creoles and immigrants, and a larger number of Negroes, Mulattoes, the offspring of Negroes and whites, and Zambos, the offspring of Negroes and Indians.

In the seventeenth century the Mosquito Indians, who lived on the east coast, entered into friendly relations with the British Government, and by British intervention the Indians of the Mosquito coast, which now forms part of Nicaragua, retain special privileges. Logwood cutters from Jamaica settled on the coast of Yucatan in the seventeenth century, and the colonists, by defeating a Spanish attack in 1798, definitely established the colony of British Honduras. In the sixteenth century Central America and Chiapas formed one Spanish colony, the Captain-generalship of Guatemala, which became independent in 1823, when Chiapas was included in Mexico, and the rest formed the United States of Central America. In 1839 they broke up into five separate republics, and attempts at reunion, although frequently made, have hitherto come to nothing. In 1896 Nicaragua, Honduras and Salvador formed themselves by the Treaty of Ampala into the *Republica Mayor de Centroamerica*, with common representation in foreign countries, but the agreement did not continue. Although there is complete religious freedom in all the

Central American republics, by far the most of the people are Roman Catholics.

Productions and Trade.—As yet minerals are only worked extensively in Honduras and the north of Nicaragua, where gold and silver are mined. There is a little gold-washing and some lead mines in Guatemala, and lignite deposits are known in several places, although not worked. There is scarcely any manufacturing industry except the weaving of silk, wool and cotton on a small scale. *Altos* in Guatemala has woollen factories and a great annual market is held at *Esquipulas*, in the same republic. The export of mahogany and logwood, india-rubber and other forest products is considerable; Balsam of Peru is sent out from Salvador, and a certain amount of vanilla and sarsaparilla are also exported. Most of the people live by agriculture and the collection of forest produce, the nature of the cultivation depending on the climate, as each particular branch is concentrated in a special zone. Cattle-breeding is mainly carried on in the dry regions of the savannas and the scattered oak and pine woods, which form natural pastures. Honduras and Nicaragua are specially favourable for cattle-rearing, while the highlands in the high district of Guatemala are important for sheep. The cultivation of the cochineal insect was once important, but has now ceased. The cultivation of the soil is even more influenced by climatic conditions, although the most important crops, maize and beans, which form the staple food of the people, flourish in every climate and at all altitudes up to 10,000 feet. Other cultivated plants are confined to the warm, moist land, like cacao; to the warm, dry land, like indigo; or to the warm and temperate belt, like coffee, tobacco, sugar-cane, rice and cotton; while others are confined to the cold land, like grain, potatoes and apples. Some products are insufficient for home use; the cacao production barely suffices for the home demand and even flour must be imported from abroad. The only plantation product, except indigo from Salvador, which is exported in large quantities is coffee, which is of very fine quality, principally in Alta Verapaz and Costa Rica. Guatemala and Salvador have the largest coffee export, Costa Rica and Nicaragua produce about one-quarter as much, and in Honduras the export is only beginning.

Means of Communication.—The most important seaports of Central America are: in **Guatemala,** on the Pacific coast, the open roadsteads, *San José*, *Champereco* and *Ocós*, which carry on a large trade in coffee; and on the Atlantic, *Livingston* and *Puerto Barrios*, the latter a good natural harbour, but not well situated for trade. The chief harbours of **Salvador** are *Acajutea*, *Triumfo* and *La Union*; in **Honduras,** on the Atlantic coast, *Puerto Cortez*; and *Amapala* on the Pacific. **Nicaragua** has on the Atlantic side, *Bluefields* and *San Juan del Norte* (*Greytown*); on the Pacific, *Corinto* and *San Juan del Sur*. The harbours of **Costa Rica** are on the Atlantic side, *Puerto Limon*; on the Pacific coast, *Punta Arenas*. The means of communication in the interior are still

somewhat undeveloped ; quite recently railways have been constructed or planned to the principal centres of coffee production, and lines joining the Atlantic and the Pacific seaports are open or under construction in Costa Rica, Honduras and Guatemala. Regular steamer communication is kept up on a number of the lakes. The system of roads, on which goods are conveyed in two-wheeled ox-carts, is still very imperfect, and in the mountainous parts of the interior only mules and other beasts of burden can be employed. The Indians still continue to carry loads on their backs in wooden vessels supported by a strap round their foreheads.

Political Divisions.—Central America is divided into six republics and one colony, the principal divisions and towns of which can merely be enumerated.

Guatemala is divided into twenty-two departments. The capital, *Guatemala*, an inland town, is the seat of an archbishop, of a university and other educational establishments. The other important places are *Quezaltenango*, *Antigua Guatemala*, which was formerly the chief town of Central America, *Chiquimula*, and *Coban*.

Salvador is divided into fourteen departments; its capital, *San Salvador*, is the seat of a bishop and of a university, and stands near its port, *Libertad*. *S. Ana*, *S. Vicente* and *S. Miguel*, are the other towns.

Honduras is divided into fifteen departments, *Tegucigalpa* is the present capital, but that rank was formerly held by *Comayagua*, which is still the seat of a bishop ; both towns stand on the high plateau.

Nicaragua has thirteen departments. Its capital is *Managua*, on the lake of the same name, but *Leon* is a larger town and the seat of a bishop. *Granada* on Lake Nicaragua, *Masaya* and *Chinandega* are also large towns, and *Greytown*, at the mouth of the San Juan river, will become important when the projected Nicaragua Canal is carried out.

Costa Rica contains seven provinces. Its capital, *S. José de Costa Rica*, high up on the mountains, is the seat of a bishop, and *Cartago*, the former capital, is also an important town.

Panama.—Formerly a province of Colombia. See p. 828.

British Honduras.[1]—The Crown colony of British Honduras, formerly dependent on Jamaica, was given a separate organisation in 1884. It is divided from Mexico by the river Hondo, and by the river Sarstoon from Guatemala in the south. The western boundary is an arbitrary line. The coast is bordered by a maze of small islands and coral reefs, rendering navigation difficult. The principal river is the Belize, crossing the centre of the colony, and separating the hilly southern part, where the Cockscomb Mountains reach 4,000 feet, from the flat northern portion, a great part of which is occupied by swamps and lagoons, or shallow lakes.

FIG. 373.—*The Badge of British Honduras.*

[1] By the Editor.

Practically the whole area is under forest, and forest products, which attracted the "Baymen" in the seventeenth century, continue to be the staple exports of the colony. Mahogany and logwood trees are felled in the forests of the interior, and floated down to the coast, the quantity of the roughly hewn logs sent out each year largely depends on the amount of water in the rivers available for floating them. Coco-nuts and bananas are largely grown for the American market.

The population contains only one per cent. of Europeans; but, for the tropics, British Honduras is considered not unhealthy, many of the whites being descended from early immigrants. Besides the usual mixed races there are Caribs in the south, the remnant of those deported from the West Indies. *Belize*, the one town, is named after Wallace, an old buccaneer. It has no harbour, steamers having to anchor a mile or more from the river-mouth and work their cargo from lighters.

STATISTICS (*Approximate*).

	Area in sq. miles.	Population.	Density of pop. per sq. mile.	Largest Town.	Population.
Guatemala ..	42,400	1,365,000	32	Guatemala	65,000
Salvador	8,100	780,000	96	San Salvador	25,000
British Honduras	7,500	31,000	4	Belize	7,000
Honduras ..	46,300	382,000	8	Tegucigalpa	12,600
Nicaragua ..	47,800	313,000	7	Leon	34,000
Costa Rica ..	20,800	263,000	13	S. José	19,000
Central America	172,900	3,134,000	160		

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CHAPTER XLII.—THE WEST INDIES

I.—GENERAL FEATURES

By J. Rodway,
Georgetown, Demerara.

Position and Structure.—The West Indian Islands extend as a natural breakwater in front of the Caribbean Sea and Gulf of Mexico, from 27° N. off the coast of Florida to 10° N. near the shores of Venezuela. They contain colonies of the Danes, French, Dutch, territories of the United States, and independent republics, but the United Kingdom holds the greater number of the islands. The islands vary in size from Cuba,

FIG. 374.—*The West Indies.*

which is one-third larger than Ireland, to tiny rocks and keys (or cays) just rising above the sea. They differ also in geological structure ; some probably once formed part of the continent, some are composed of volcanic rock, others only of coral. Most of them have central ridges of mountains, and many signs of active volcanoes may be seen in the Caribbees, where eruptions and earthquakes are still experienced at intervals. Taken as a whole the islands appear to form a great mountain chain, similar to the

Andes, but deeply submerged. Rushing mountain torrents are common in all the islands ; their gullies, at one time nothing more than beds of sand and pebbles, are at another full and overflowing.

Rising from the deep blue sea, covered with rich green forests, and bathed in the splendour of tropical sunlight the rocky islands are exceedingly beautiful. In sailing or steaming along from one to another they look like ocean gems ; here a mountain enwrapped in clouds, there a field of yellow-green canes, again a little town embosomed in precipices.

Climate and Vegetation.—The climate is purely tropical. The sea-level temperature over the whole of the West Indies exceeds 80° F. on the average from May to October, and in the cooler months rarely falls below 75° F., the annual range being very small. Rainfall and local varieties of climate are dominated by the trade winds, which blow all the year round. From October to March the north-east trades blow strongly ; as summer advances they become rather weaker, and eddy, so as to blow from the east and south-east over the whole group, gradually returning to a north-easterly direction about September. One consequence of the steady easterly winds is that the windward or eastward coasts of the Caribbees are beaten on by a continual surf, while the leeward or western coasts have usually calm water, and deep, unsilted harbours. All the important towns of the Lesser Antilles lie on the west of the islands. The rainy season takes place towards the end of summer, October being the wettest month as a rule, and the dry season is at its height between December and April, when the northerly component predominates in the wind. From August to October hurricanes are frequently experienced. The local climates vary considerably in the various islands. The Bahamas are cooler and more healthy than the Caribbees, and in Jamaica the inhabitants have the cool mountain slopes to which they can retire when the coast is uncomfortably hot.

Most of the land is fertile, and in some islands particularly rich, although in others, such as the Bahamas, it is almost barren. There are few wild animals, but birds and insects are plentiful, while the flora is particularly varied and interesting. All tropical fruits and vegetables can be grown, but the staple has hitherto been sugar cane. Latterly the low price of sugar consequent on the bounties given by European countries to encourage beet growing has reduced many of the West Indian islands to a very low condition, a state of things intensified in some of the islands by civil war and bad government.

People.—Since the discovery of the West Indies by Columbus in 1492 the original inhabitants have almost entirely disappeared, leaving only a few degenerate half-breed Caribs in St. Vincent. The great labour experiment of negro slavery was tried on a vast scale, and, whatever may have been the evils of that system, there is no doubt that it was successful from an economic point of view. It has resulted in peopling the islands with a tropical race which seems well fitted to carry out their development,

and may perhaps some day make an impression on the world. Without the negro these beautiful islands would possibly have been abandoned long ago, for since the emancipation of slaves the whites are becoming fewer and fewer every decade, except in Cuba and Porto Rico. Experiments have been made in bringing labourers from India and China with good results in Trinidad, but the general position of all the islands in 1899 may be considered as almost stagnant. Yet they were of great value in the past, when they were "bones of contention" between the four great nations which fought for them, and with them the sovereignty of America. Spain was put in the background by Holland, France, and the United Kingdom, and, after many changes, the existing partition of the islands was brought about. The future of the West Indies is bound up with the future of cane-sugar; other tropical products seem likely (1898) always to remain of secondary importance.

The islands are linked together by telegraph cables, which connect with North and South America. There are several lines of steamers running regularly between the West Indies and Europe

II.—CUBA

By Robert T. Hill,
Geologist, U.S. Geological Survey.

Position and Coasts.—Cuba, the largest and richest of the West Indian Islands, lies just within the tropics; its most northerly point is within 100 miles of Key West, its most southerly within 100 miles of Jamaica. The island is 720 miles long, and from 25 to 100 miles wide. Its area, including 1,300 keys (cays) or islets, is 45,000 square miles, of which 10 per cent. is cultivated, 4 per cent. forest-land, and the rest unreclaimed. Cuba has three natural divisions, the eastern mountains, the central plains with occasional hills, and the western central axial mountains bordered by sloping valleys. Excepting the swamp region, the island is thoroughly drained. The coast-line measures 2,000 miles; with embayments and islets it is over 6,800 miles. Except on the south central side the coast is abrupt, and bordered by a narrow bench of coral reef elevated 15 feet above the sea. The eastern coast, 600 feet high, is rugged, with stair-like terraces. The land-locked harbours with narrow entrances are adapted for commerce and defence. The keys,

Fig 375.—*Havana Harbour—a typical natural harbour of Cuba.*

which border one half the coast, are coral or mangrove islets growing up from shallow platforms ; lack of good water makes them uninhabitable.

Configuration.—The higher eminences in the interior are true mountains of deformation, composed of disturbed sedimentary rocks with igneous intrusions. They occur in three independent groups in the eastern, western and central portions. The highest range, the Sierra Maestra, dominates both coasts of Santiago de Cuba. Its loftiest crest, Pico del Turquino, has an estimated height of 6,800 feet ; its lower slopes are terraced. The central high mountains are less angular than the Sierra Maestra, and their summits (the highest, El Potrerillo, 2,900 feet) have radiating slopes. They are composed of semi-crystalline limestones and shales, doubtfully considered Palæozoic, flanked by disturbed Cretaceous and Tertiary beds. The Sierra de los Organos forms the island's axis west of Havana, and is an elongated ridge of various geological formations. It culminates in the Pan Guajaibon, altitude 2,532 feet. Low hills and mesas of circumdenudation capped by Tertiary limestone, 3,000 feet of which once enveloped the island, form an extensive plateau north of the Sierra Maestra, with terraced cliffs towards the sea ; they include the Mesa Toar and Junki de Baracoa, sometimes mistaken for craters. The upper edge of this plateau is cut into knife-edged salients ; the lower stair-like benches are crossed by vertical canyons, through which the drainage finds outlets to the sea. In Matanzas and Havana provinces, the arch of the plateau, whose crest on the northern side presents a cliff topography, descends nearer sea-level, develops a longer but gentle slope toward the south coast, and ends in the Zapata Cienaga and the shallows between Cuba and the Isle of Pines. The brackish swamp, Zapata, occupies 600 square miles on the southern coast. The famous valleys of Cuba are either wide plains threaded by rivers reaching the sea, or amphitheatres within the limestone plateau.

The rivers are voluminous in proportion to their catchment areas. The streams run through widely sloping valleys ; canyons are not developed until the coastal rim of harder limestone at the entrance of the pouch-shaped harbours is reached. Many streams flowing southward disappear in vast swamps. In limestone formations the drainage is mostly subterranean, and beautiful caverns abound, the largest underlying the eastern Cuchillas. There are also waterfalls, natural bridges, mineral springs, and baths, the usual accompaniments of such karst phenomena.

Climate.—There are no extensive climatological records except for Havana, and these do not apply throughout Cuba. Rains are most abundant from May to October ; those brought by the trade-winds are heaviest and most frequent on the higher eastern slopes. At Havana the annual rainfall is about 52 inches, of which 32 inches fall in the wet season. The average number of rainy days in the year is 102. The air is usually charged with 85 per cent. of moisture. Snow has only once been recorded in Cuba, in 1856. At Havana the mean annual temperature is 77° F. ; in

July and August the average is 82° F., fluctuating between 88° and 76°; the highest temperature recorded there during ten years was 100°. In December and January the thermometer averages 72° with a maximum of 78° and a minimum of 50°; but on the interior elevations the freezing point is reached in winter. The diurnal range of temperature averages 10°. At Santiago the temperature is higher than on the northern and western coasts, and averages 80°, with a difference between the warmest and coldest months of 6° F. The easterly trade-wind prevails, but from November to February cool north winds of short duration occur in western Cuba, where also a refreshing sea-breeze blows in the afternoon. The island is subject to hurricanes.

Flora.—A voluptuous flora covers the surface and includes characteristic forms of the West Indies, southern Florida, and the Central American seaboard. Many large trees of the Mexican Tierra Caliente reappear in western Cuba. Numerous palms, including the royal palm, occur, and the pine tree is associated with palms and mahoganies in Pinar del Rio and the Isle of Pines; other woods are the lignum-vitae, the granadilla, coco-wood, out of which reed instruments are made, and Cedrela odorata, used for cigar boxes and linings of cabinet work; fustic, logwood, and mahogany are largely exported from Santiago. There are still about 13,000,000 acres of uncleared forest. Nutritious grasses are found; the pine-apple, manioc, sweet potato, and Indian corn are indigenous. More than 3,350 native plants have been catalogued.

Fauna.—The peculiar fauna includes only a few indigenous land mammals. One rodent, the agouti, is as large as our domestic rabbit; another is the solenodon, whose family has other representatives only in Haiti and Madagascar. There is a species of iguana, but there are no poisonous snakes. The crocodile, on the Isle of Pines, is the species which occurs in southern Florida, Jamaica and Central America. There are few fresh-water fishes. A large lepidosteus, similar to the alligatorgar of the southern United States, occurs. Insect life abounds, and there are many arachnids. Land molluscs with gorgeous colouring are found. Birds are numerous, and the parrot is conspicuous; there is only one indigenous humming bird. Collectively, the fauna proves the long isolation of Cuba from continental lands.

History and People.—Beginning on the west, Cuba is divided into six provinces, Pinar del Rio, Havana, Matanzas, Santa Clara, Puerto Principe, and Santiago. A century before the Anglo-Saxon settlement of the New World, Spaniards colonised Cuba and built Baracoa, Santiago, and Havana. A search for gold yielded little return except the ornaments of the soon exterminated natives. Pastoral pursuits developed; the indigenous tobacco, and sugar-cane imported from the Canaries, were cultivated and African slavery introduced. Morro Punti and other fortresses were begun before 1600. The second century of occupation saw increased agricultural development and colonisation, and fear of English

buccaneers and French and Dutch pirates resulted in the primitive fortifications of the coastal cities. The wise administration of Las Casas and its after influences held Cuba loyal to Spain, even during the times (1794–1820) when the latter lost her mainland colonies and San Domingo. The Spanish decree of 1825 gave the Captains-general despotic authority, ended domestic peace, and initiated insurrections which only ended with the fall of Santiago in July, 1898. During the nineteenth century Spain made various pretences of extending Cuba's political privileges, but all lacked the true essence of local self-government, and absolute power remained with the Spanish Captain-general. The Spanish government was devoted to the enrichment of officials and to retaining Cuba as a colony. The United States resolved in 1898 to put a stop to bad government in Cuba, and after a short war with Spain the island was taken under American protection on January 1, 1899. A constitution was adopted in 1901, and in 1902 Cuba became an independent republic. The people of Cuba are for the most part descended from the early Spanish settlers, reinforced by later immigrants from southern Europe, and affected in part by a considerable infusion of negro blood. It is impossible to obtain accurate statistics of the changes of population, because no reliable census was taken for many decades. About 32 per cent. of the population are black or coloured, using the latter word to mean a mixture of the black and white races. The Spanish language is in universal use, and almost all the people are Roman Catholics. There is a university at Havana, and there are now many schools.

Resources.—The products of the island are sugar-cane of a superior quality, tobacco, coffee, bananas, Indian corn, oranges and pines in the order named. Cuba leads the world in sugar production, the amount of which in 1893–94 was 1,054,000 tons, all of which except 30,000 tons was exported. During the revolution the production sank to one-third, but in 1900–01 it had risen again to 600,000 tons. The sugar lands are upland soils, and more fertile than those of the other West Indian islands; the cane is planted only once in seven years; no fertilisers are used; the estates possess recent inventions for the cultivation of the cane, the extraction of its juices, and their conversion into the crystal. Thus sugar cultivation in Cuba has remained profitable in spite of the general depression in the cane-sugar trade.

Tobacco, while secondary to sugar, is far more profitable in proportion to acreage. This product grows well throughout the island, but the chief seat of its cultivation is the southern slopes of the Sierra de los Organos, in Pinar del Rio—the famous Vuelta Abajo region. Good tobaccos are exported from *Trinidad*, *Cienfuegos* and *Santiago*. There are large cigar factories in *Havana*, and great exports of baled tobacco from eastern Cuba are sent mostly to the United States. Coffee (introduced by the French from Martinique in 1727) was once extensively exported, but the trees have been replaced by sugar-cane or destroyed during revolutions. Bananas

have been an important export in eastern Cuba. Delicious oranges grow everywhere. Pine-apples are exported from western Cuba and the Isle of Pines. Besides the large estates there are many small farms devoted to fruit growing, market gardening and dairy products.

On the fertile grazing lands of Santa Clara, Puerto Principe and Santiago, fine animals of Spanish stock are produced. Horses are bred throughout Cuba. The developed mineral resources are iron ores, asphaltum, manganese, copper and salt. A little gold and silver were mined in past centuries. Iron ore has proved the chief metallic resource; the Sierra Maestra mines produce mixed brown and red hematite, containing from 65 to 68 per cent. of pure iron. They occur in the white limestone that for 2,500 feet incrusts the seaward face of the porphyritic and granitoid core of the mountains. The production in 1890 was 362,068 tons, amounting to one-fourth the total importation of iron ores into the United States for the same period. Rich deposits of manganese occur in the Sierra Maestra range near Ponupo. Asphaltum of unusual richness is found near *Villa Clara*, beneath the waters of Cardenas Bay and in beds of late Cretaceous and early Eocene age. Copper occurs at many places; from 1524 to 1867 it was mined at *Cobre*. Salt is made abundantly along the northern keys. There are natural salt pans along the margin of Cayo Romano, depressions twelve to sixteen inches deep, separated from the sea by coral banks over which the waves wash in stormy weather. Clays for brick and roofing tiles abound in the non-calcareous formations, especially in the eastern provinces. The universal building material is limestone and lime products, such as plaster and cement.

Communications.—The larger part of the thousand miles of public railways is comprised in the United System of Havana, which extends west and east from Havana through the tobacco and sugar districts of the Vuelta Arriba and Vuelta Abajo and, within a day's journey, reaches the principal cities west of Cienfuegos and Sagua la Grande. The western terminus is Pinar del Rio, 106 miles from Havana; the eastern terminus is Villa Clara, 150 miles distant. One line runs south from Havana to Batabano and meets the south-coast steamers. On sugar-estates narrow-gauge railways are freely used in handling cane; they communicate with the interior, in connection with coasting steamers and broad-gauge lines. Good highways are short and few; and even common roads for wheeled vehicles hardly exist, except near larger towns.

FIG. 376.—*The Railways of Cuba.*

Trade.—Most of Cuba is accessible to maritime transportation. The

chief harbours on the north coast are Bahia Honda, Cabanas, Havana, Matanzas, Sagua, Nuevitas, Gibara, Nipe, and Baracoa; and on the south, Guantanamo, Santiago de Cuba, Manzanillo, Trinidad and Cienfuegos. The shipping trade, both foreign and coastal, is extensive; steamers coast the island, the north coast being served from Havana and the south from Batabano, the southern out-port of Havana. Although Cuba naturally commands the commerce of the American Mediterranean, trade and communication with the adjacent regions, other than Mexico, have not hitherto been encouraged. The essentials of Cuban commerce are: (1) a large balance of trade in favour of the island; (2) preponderating consumption of the exports by the United States; (3) the division of the imports between other countries; and (4) the absence of trade with the neighbouring regions—except the United States—of which the island is the natural commercial centre. The trade of the United States with Cuba, which has recently been summarised by Mr. John Hyde, statistician, reached its high-water mark in 1892–93, when it amounted to £20,460,000, the ratio of imports, £15,741,000, to exports £4,721,000, being approximately as ten to three. In 1901 the total was £14,200,000, of which the exports amounted to £5,300,000, showing a remarkable proportionate increase.

STATISTICS (*approximate*).

Area of Cuba, in square miles	45,000
Population (1899)	1,572,845
Density of population per square mile	36

POPULATION OF CHIEF TOWNS, 1902.

Havana (Habana)	275,000	Matanzas	36,374
Santiago	43,090	Cienfuegos	30,038
Puerto Principe	25,102	Cardenas	21,940

There are no trustworthy trade statistics on account of the long period of political disturbance in the island.

III.—PORTO RICO

By Robert T. Hill,
Geologist, U.S. Geological Survey.

Position and Configuration.—The island of Porto Rico lies in the same tropical latitude as Jamaica, and is separated from Cuba by the island of Haiti. Although discovered by Columbus in 1493, and conquered in 1508 by Ponce de Leon, it has never yet been systematically explored. The island is 95 miles long, 35 miles wide, and has a coast-line of 360 miles. It presents a picturesque hilly landscape. Central mountains with broken slopes extend through its greatest length, and culminate in the Yunque of the Sierra Luquillo, 3,609 feet high. Remnants of the virgin forests are still found on the sierra heights. The slopes are gently rolling divides, succeeded towards the littoral by well-drained plains. The undulating surface is adapted to pasture and the more ordinary kinds of cultivation, and is intersected by numerous perennial rivers.

According to Cleve, the Swedish naturalist, the northern hills are fragments of a thick series of limestone strata which have been cut through by water. They have little inclination, and dip seaward from the axis of the island at a low angle. The mountain summits are covered by the Antillean Tertiary limestone, a formation which is usually hard and yellowish-white. In the mountains of the interior an older formation of conglomerates and metamorphic rock, similar to the older rocks of Jamaica, is visible below the limestones. The rocks of the littoral are probably elevated coral reefs. Great living reefs abound along the south coast. The numerous streams have contributed to the wealth of Porto Rico ; some are navigable for small vessels, but have troublesome bars across their mouths.

Climate.—The mean monthly temperature hardly varies 6°, and the extreme limits observed are within 40° of each other. The hottest months are June, July, August and September ; the coolest, December, January and February. The average daily temperature is 80° F., but a cooling north breeze prevails during the hottest days. The thermometer averages 88° F. at noon, sinks to 81° at night, and sometimes falls to 61° F. The highlands are cooler, but snow never falls, and hail rarely. Disagreeable land winds are unusual ; but tropical hurricanes are frequent between July and October. The central mountains cause frequent showers on the northern side, while the southern district remains without rain for months. The average annual rainfall for twenty-five years at San Juan is 54 inches, that at a station in the Yunque, 134 inches. The driest months are January and February, the wettest are October and November.

Resources.—According to Cleve, mercury is found in the Rio Grande, and gold in loose pieces in the Sierra Luquillo and Corozal rivers ; placer gold was mined by early Spanish settlers. Specular iron is reported, notably on the Rio Cuyul, and magnetic iron ore from Gurabo and Ciales ; agate of good quality, malachite and other ornamental or precious minerals occur.

Porto Rico contains many large trees ; in the higher parts the forests are open, and largely without parasitic vegetation. The species include several palms, two tree ferns, cedar, ebony, sandal-wood and many trees suitable for building purposes ; while there are numerous medicinal plants and others used for condiments, dyes and tanning.

Agriculture is sufficiently diversified to produce food for the inhabitants besides large crops of sugar and coffee for export. The land is mainly divided into small independent holdings belonging to the peasantry of the interior. Small fruit farms are the most numerous, but there are many small and some large coffee estates, and a number of sugar estates, cattle farms and some tobacco plantations.

The island contains no native mammals, except a single species of agouti, although introduced domestic species flourish. In the mountains there are many birds ; flamingos and other water-birds frequent the coast ; fish abound in the fresh water, and a gigantic tortoise is found.

People and Government.—Porto Rico for three centuries was only a penal station. The aborigines, of Arawak or Carib stock, were nearly exterminated in 1811 after an uprising against the Spanish. The present native people are of four classes: the Creoles, who call themselves Spaniards; the lower class of white peasantry, or Gibaros; the coloured people, or Mestizos; and the blacks. In 1615 a decree invited colonists to the island on most liberal terms. Lands were allotted gratis; the settlers were free from direct taxes, and for a certain number of years from tithes, alcabala, and export duties, which then formed an impolitic feature of the Spanish system. With this decree the prosperity of Porto Rico began, and Spanish capitalists driven from San Domingo and the Spanish Main about the same period, helped to develop the resources. The negroes of Porto Rico are in a minority. When emancipation was given in 1873 industry survived, the planters continuing their agricultural operations without financial ruin or social disorganisation.

For administrative purposes the island was divided into seven departments, including seventy villages. These departments, named after their chief towns, each contain about 100,000 inhabitants. Three small islands adjacent to Porto Rico constitute parts of its political organisation. These are Mona on the west, and Culebra and Vieques on the east.

Porto Rico was assumed as United States territory at the close of the Spanish-American war of 1898, when Cuba was taken under American protection. The Catholic bishopric of Porto Rico was founded in 1504, under Pope Julian II., and was the first established in the New World. Instruction is divided into primary, secondary and superior. There are eight superior schools for boys, four for girls, and many elementary classes and private schools, while in San Juan there is a college, with courses in medicine and law, and a normal school for both sexes. Eighty-seven per cent. of the people are, however, illiterate.

Trade and Towns.—The industries are limited to the preparation of sugar and coffee for market, and the manufacture of tobacco, chocolate, wax, soap, matches, rum and straw hats; but there are a few foundries for manufacturing iron machinery. The productions for export are sugar-cane, coffee, tobacco, cacao and cotton. Sugar-cane on the lower slopes and plains yields about 6,000 pounds to the acre. A peculiar variety of upland rice, together with yuachia and plantains, are staple foods of the labourers; bananas, maize, beans, yams, sweet potatoes, mangoes, pine-apples and other fruits are also of importance.

The larger commercial towns, mostly seaports, are: *San Juan, Ponce, Mayaguez, Aguadilla, Arecibo, Fajardo, Naguabo, Arroyo,* and *San German.* The principal ports are San Juan on the north; Fajardo and Enshhada Honda on the east; Ponce and Guanica on the south; and Puerto Real de Cabo Rojo on the west. Playa is the best port.

The island has communication by steamer with Europe, the other

islands of the West Indies, and the two neighbouring continents; two lines of steamers circumnavigate it, stopping at the various ports. There are about 150 miles of railroad in operation, and as much under construction.

STATISTICS.

Area of Porto Rico in square miles	3,668
Population of Porto Rico in 1899	953,243
Density of population per square mile	260
Population of Ponce	27,952
„ San Juan	32,048

COMPOSITION OF THE POPULATION.

White.	Coloured.	Negro.	Total.
589,426	304,352	59,390	953,243

IV.—HAÏTI AND SANTO DOMINGO

By J. Rodway,

Georgetown, Demerara.

Physical Features of Haïti.—The island of Santo Domingo, better known by its old Carib name of *Haïti* (rough land), or by the name *Hispaniola* bestowed on it by Columbus in 1492, is separated from Cuba by the Windward Passage, and from Porto Rico by the Mona Passage, both much frequented by vessels entering the Caribbean Sea. The outline of the coast is remarkable, and the island is nearly as large as Ireland, the length being about 400 miles and the greatest breadth 160. Four chains of mountains corrugate its surface, running nearly parallel to each other, separated by depressions, and all trending nearly east and west. The Monti Cristi range, parallel to the north coast, is succeeded by the great Cibao Chain, which forms the north-western peninsula and runs to the extreme east end of the island; it bears the highest summit in the West Indies, Loma Tina (10,300 feet). Between these ranges lies the broad plain called by Columbus *Vega real* or the royal garden, a region of great fertility, traversed by large rivers. The southern range forms the south-western or Tiburon peninsula, and runs along the western half of the south coast. Gold, silver, copper and other minerals are found, while for the variety of its vegetable productions it is unexcelled by any of the other islands.

History and People.—This magnificent island was the first to be colonised by Spain, and horrible persecutions and massacres of the natives took place, which led to the entire extinction of the aborigines within about fifty years. Haïti was then almost deserted for a time, save as a place of call. Plantations were neglected; cattle, hogs and dogs ran wild and increased to a wonderful degree, until the French buccaneers settled in some of the western bays, and especially on the small island of Tortuga. They lived by hunting the wild cattle and by piracy, until gradually taking

possession of a great portion of Hispaniola, about one-third of the island was ultimately ceded to France by treaty in 1697. From that period the portion now known as Haïti became the most flourishing colony in the West Indies, until by the blunders of the first French Republic and then of Napoleon I. it was entirely lost. The Republic declared the rights of man and freed the slaves; Napoleon, on the petition of the whites, rescinded this resolution, and ordered the negroes back into slavery. The result was a series of massacres, ending in the erection of a negro republic where no white man could hold any real property. Since 1810 there have been negro emperors, kings, and presidents, Haïti has been joined to Santo Domingo, which proclaimed its independence in 1821, and again separated, and the whole island has been almost ruined. There are, however, no reasons why it should not be very prosperous, save the want of good government and the virtual absence of white men.

The Republic of Santo Domingo.—The eastern republic of Santo Domingo is divided into six provinces and six maritime districts, and is governed by a President and a Congress of twenty-four members, who are elected for two years. The exports are coffee, timber, tobacco, cacao and sugar. The capital is the old Spanish city of *San Domingo* on the south-east coast, and there is a port on the north named *Puerto Plata* of about the same size. The Spanish language is universally spoken; but the people are almost entirely negroes and half-breeds.

The Republic of Haïti.—The western portion of the island known as Haïti is smaller in area, but of greater importance than its sister republic, still retaining the superiority which existed while both were European colonies, and that due to its command of the great western gulf between the two long mountainous peninsulas. The government is administered by a President, Senate, and House of Representatives, but it is generally considered to be rather that of a military despotism than of a republic. The capital is *Port-au-Prince*, the towns of *Cape Haitien*, and *Aux Cayes* are also important. A patois derived from French is commonly spoken, but pure French is the tongue of the better classes. There are but few whites, and these labour under civil disabilities that may almost be compared with those formerly laid upon the coloured people under French rule. The exports are coffee, mahogany, logwood and cotton.

There are several islands off the coast; the largest is Gonave, 37 miles long by 9 wide, but on account of its being destitute of springs, it is hardly habitable. There is also the old rendezvous of the buccaneers, Tortuga, which is 22 miles long by 8 broad, and La Saona, nearly as large.

STATISTICS (*estimates about* 1890–91).

	Area sq. miles.	Population.	Density of Pop.	Imports £	Exports £	Capital.	Population.
Santo Domingo..	18,045	610,000	34	537,000	585,000	Santo Domingo	15,000
Haïti	10,204	1,400,000	140	2,012,000	2,833,000	Port au Prince	50,000

V.—THE WEST INDIAN COLONIES

By J. Rodway,
Georgetown, Demerara.

THE BAHAMAS

Bahamas.—The Bahama Islands are the most northerly of the West Indies, comprising about 3,000 low coral islets, rocks and banks. The whole group is a British possession, and about twenty of the islands are inhabited. The most important are New Providence, Abaca, Harbour Island, Eleuthera, Inagua, Mayaguana, Ragged Island, Rum Cay, and the Biminis, all of which are ports of entry. Besides these there are the Great Bahama, Crooked Island, Cat Island and Watling Island (San Salvador), Columbus's supposed landfall. Compared with the southern islands most of the Bahamas are little more than barren wastes, rising but a few feet above sea-level, in some places so low that salt lagoons penetrate to great distances beyond the shore. The most conspicuous plant is the agave, from which sisal hemp is obtained as an article of commerce. Some of the islands are covered with its rosettes of spiny leaves almost to the exclusion of other weeds.

People and Industries.—Three-fourths of the population are black or coloured people; but the English language is the only one spoken. The islands were originally taken possession of by the English at the first settlement of Virginia, but for a long period they were little more than harbouring places for pirates. The early colonists suffered from the raids of Spaniards and French, and in 1781 the islands were captured by the former, to be restored to Great Britain, however, at the peace of 1783.

The main industries are sponge-fishing and salt-raking; from natural ponds, where sea-water is continually flowing in and evaporating, the crystals of salt are raked into flat-bottomed punts and piled in heaps on the shore until ready for removal. Coral, shells and turtle-shell are also obtained by fishing and diving; fruit and early vegetables are grown for the American market, and some of the islands yield guano. The capital and only town of importance is *Nassau* on the island of New Providence.

JAMAICA

Position, Surface and Productions.—About 100 miles west of Haïti, and 100 miles south of Cuba comes Jamaica, the largest of the British West Indies. From east to west its greatest length is about 150 miles, and its breadth from north to south 50 miles. A range of mountains runs through the axis of the island from east to west with numerous projecting spurs; the highest peak of the Blue Mountains rises to 7,400 feet. Numerous small rivers flow from both sides of this range, but none are navigable. The name "Jamaica" comes from a native word meaning

"land of springs." The climate differs according to altitude, that of the lower levels being typically tropical, while the temperature on the hills is lower according to the height. There are extensive forests, and the mountain streams are broken by numerous falls and cataracts. All tropical productions can be grown to perfection, and the exports are more varied than those of the other British West Indies. The sugar plantations, once so famous, have now dwindled to an area of only 26,000 acres, and although other products have been largely increased by the introduction of banana and orange planting for the American and British markets, the island has never regained the prosperity which it lost on the emancipation of the slaves. Its chief exports are now bananas, oranges, sugar, rum, coffee, ginger, pimento, logwood and cacao.

FIG. 377.—*The Badge of Jamaica.*

People, History and Government.—The population consists mainly of black and coloured people, the whites numbering only 2½ per cent. of the whole, and the proportion of East Indians is about the same. The island was first settled in 1509 by the Spaniards, and was conquered in 1655 by a British force sent out by Oliver Cromwell, since which time it has remained in the hands of Great Britain. Charles II. granted it a constitution in 1662, but in 1866 this was surrendered in favour of a Governor and Council, partly official and partly elective. The island is divided into three counties, Cornwall in the west, Middlesex in the centre, and Surrey in the east; these are subdivided into parishes the unit of local government being the Parochial Board.

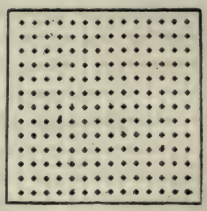

FIG. 378.—*Average population of a square mile of Jamaica.*

Resources and Towns.—There are few industries beyond the raising of agricultural produce. Jamaica rum has long been famous throughout the world, and is unique in flavour. Jamaica coffee and ginger are also well known, while pimento is obtained almost exclusively from this island. Attempts have been made to introduce tobacco growing and cigar making, but hitherto with only moderate success. The capital is *Kingston*, which is well situated on a good harbour in the south-east of the island. The town was practically destroyed in 1907 by an earthquake, similar to that which submerged the greater part of the town of Port Royal on the opposite side of the harbour in 1692. The seat of government was formerly *Spanish Town*, which lies a few miles inland. A railway extends from Kingston to Montego Bay, in the north-west, 113 miles distant, another to *Ewarton* on the mountains, and a third to *Port Antonio*, on the north-east coast, a distance of 54 miles. The roads in the island are fairly good, but liable to injury by floods. From an economic point of view Jamaica is much behind Cuba and Porto Rico, but it may be safely predicted that it

is destined to become prosperous in the near future as one of the fruit gardens for the United States, and as a winter resort for North Americans.

Turks and Caicos Islands, the most southerly of the Bahamas, are under the jurisdiction of Jamaica. They consist of about twenty islands and cays, forming two groups. The Turks Islands were so called from the prevalence of the turk's-head cactus, which gives a character to the barren soil. The most important of the group is Grand Turk, which is 6½ miles long by 2 wide. In South Caicos the small town, *Cockburn Harbour,* is a port of entry, and there is another port on Salt Cay. Most of the black and coloured people are descended from the slaves of loyalist refugees who left the southern States during the American War of Independence. Up to late years these people have been living a half savage life, but latterly, by the introduction of sponge-fishing, salt-raking and the cultivation of sisal hemp, some progress has been made.

The Cayman Islands are also under the jurisdiction of Jamaica, from which they are distant about 180 miles to the west. Grand Cayman is 17 miles long by 7 broad, in some places rock-bound, and in others protected by coral reefs. The Morant Cays and Pedro Cays are small islands with a few inhabitants engaged in turtling and collecting guano.

DANISH WEST INDIES

Virgin Islands.—Immediately to the east of Porto Rico commences the line of the Lesser Antilles or Caribbees, which form a perfect bow with the convex part stretching into the Atlantic. The first group, going south, is that of the Virgin Islands, rising from the extensive bank which runs east from Porto Rico. Thirty-two of them belong to Great Britain and two to Denmark.

The Danish Islands are St. Thomas and St. John in the Virgin group, and St. Croix. They were once under cultivation to a considerable extent, but they are now almost bare, only covered with a scrubby vegetation consisting mainly of lantana, or sage bush, from amidst which the ruins of plantations can here and there be discerned. But although once largely supplied with plantations, their old prosperity was perhaps more due to the fact that when the other nations ruling the West Indies were at war, Denmark remained strictly neutral. **St. Thomas,** with its commodious land-locked harbour, was a free port, and as such it reaped to the full its remarkable advantages of position. Pirates, privateers, men-of-war and merchant vessels of all nations met within its harbour in peace and safety, and obtained supplies from its traders. Of late years, however, St. Thomas has very much declined, and it is now little more than a port of call. The area of the island is 23 square miles, and its population 12,000, most of whom

FIG. 379.—*St. Thomas.*

live in the capital, *Charlotte Amalie*, which is also the capital of the Danish West Indies. **St. John** has an area of 42 square miles, but a population of only 900. The island, in fact, is virtually ruined. **Santa Cruz** or St. Croix, is the largest of the Danish West Indies, with an area of 74 square miles. Once noted for its plantations, it has much diminished in the output of sugar, rum and molasses. The capital is *Christiansted*. Very little Danish is spoken either here or at St. Thomas, English being generally used; the St. Thomas negro, however, is noted for having a smattering of several languages, which is a necessity from the island being the resort of so many nationalities. It has often been rumoured that the United States were about to buy these islands.

DUTCH WEST INDIES

Dutch Antilles.—In the group south-east of the Virgin Islands are the small Dutch possessions of Saba, St. Eustatius, and St. Martin's (an island half of which belongs to France). These are included under one government with Curaçao, Buen Ayre, and Aruba, which are situated far away, off the coast of Venezuela. The whole have an area of 400 square miles and less than 50,000 inhabitants. **Saba** consists of a single volcanic cone rising 1,500 feet above the sea. Steps lead from the shore to a height of 800 feet, where, within the ancient crater, the settlement has long been established. The inhabitants, who number nearly 2,000, grow fruit and vegetables, which they sell to other islands, and they are also expert boat-builders and fishermen. In **St. Eustatius** also, the main part of the island is a volcanic cone, but there is a stretch of fertile land on the lower slopes. It was once, like St. Thomas, a depôt for privateering and smuggling adventurers, but it has now entirely lost its former trade. **St. Martin's** has been divided between France and Holland since the year 1648. The Dutch portion is at the south of the island, and contains an area of 17 square miles, with a population of nearly 4,000. A little sugar and salt are exported, but the colony is by no means flourishing.

Dutch Leeward Islands.—The principal group of Dutch islands lies far within the bow of the Antilles and about 40 miles from the coast of Venezuela. **Curaçao** is 36 miles long by 8 broad. Down to the end of the last century it was the chief depôt of the smuggling trade with Spanish America, and was largely cultivated to supply fresh provisions to the numerous traders calling there, but now it is much depressed. The chief product is salt, but a little sugar and tobacco are grown, as well as the fruit used in flavouring the well-known liqueur named after the island. The small town of *Willemstadt* is the capital and the seat of government for the whole of the Dutch West Indies. The administration is carried on by a Governor and Colonial Council, and each island has a chief, all of whom are appointed by the sovereign. Willemstadt stands on a very safe harbour, which can be easily secured from outside enemies. **Buen Ayre**, or Bonaire, and **Aruba** are smaller islands lying respectively to the east and to the west of Curaçao.

LEEWARD ISLANDS

British Leeward Islands.—This colony includes the **Virgin Islands** and the chain of British islands as far south as Dominica. It includes, amongst others of the Virgin Islands, Anegada, Virgin Gorda, Tortola, Joost van Dyke, Peter's Island and Salt Island, with an aggregate area of about 60 square miles. The chief town is *Road Town*, Tortola. A small quantity of sugar is grown, but the few inhabitants mostly live by growing provisions, raising cattle and fishing, their surplus produce being taken to St. Thomas. Antigua, with its dependencies Barbuda and Redonda, Dominica, Montserrat, St. Kitt's or St. Christopher's, Nevis, The Dogs, and several smaller islands, also belong to the "Leeward" colony. These islands were federated under one Governor and Legislative Council in 1871; and although so numerous, their total area is only 700 square miles. Structurally, they form the peaks of two parallel volcanic mountain chains, that to the west including Saba and St. Eustatius, St. Kitt's, Nevis, Redonda, and Montserrat, and that to the east Sombrero, Anguilla, St. Martin's, St. Barts or St. Bartholomew's, Barbuda, and Antigua.

FIG. 380.—*Badge of the Leeward Islands.*

Antigua is 28 miles long by 20 broad; its coast is deeply indented and broken into bays and peninsulas with high and rocky shores, in contrast to the usual uniform outline of these islands. The whole island is beautifully diversified by hill and dale, and the highest elevation, the Shackerley Mountains, reaches 1,500. The chief productions are sugar and pine-apples, and there are many small estates in cultivation. Little more than one-twentieth of the population are whites. The island was settled by the British in 1632, and except for a short French occupation it has since remained under the same flag. English is commonly spoken. The chief town is *St. John's*, well situated on English Harbour.

Barbuda and **Redonda** are dependencies of Antigua. Barbuda is very flat, with a large lagoon on its west side; its exports are salt and phosphates. Redonda is a narrow islet, only one mile long, but is valuable for its mines of phosphate of alumina, of which about 7,000 tons are annually exported.

Dominica, lying between the French islands of Guadeloupe and Martinique, is 29 miles long by 12 broad, with bold precipitous coasts and a picturesque mountainous interior. The loftiest summit, Morne Diablotin, is 5,314 feet high, and from the mountains many rushing torrents descend, which vary much in size according to the rainfall. There are several hot sulphur springs. Good anchorage can be obtained to leeward, but there are no harbours. *Roseau*, or *Charlotte Town*, is the capital; the only other town is *Portsmouth*, or *Prince Rupert's Town*. The colony was founded by the French, and a patois of that language is most commonly spoken. The Grand Soufrière is an active volcano, and in 1880 there was

an eruption which covered the houses of Roseau with ashes and scoriæ to a depth of two or three inches. The chief exports are coffee, cacao, sugar and lime-juice.

Montserrat is 11 miles long by 7 broad. It is so rugged and mountainous that only one-third of its small area can be cultivated, the remainder being covered with magnificent forests. The highest elevation is the Soufrière Hill, 3,000 feet. *Plymouth*, the chief town, stands on an open roadstead on the south-west coast and near the fertile part of the island. The chief product is sugar; lime-juice is also of some importance for export. In 1896 a great hurricane, earthquake and flood devastated the island. The English language is universally used, and the island is said to be the most healthy of the Antilles.

St. Kitt's, or St. Christopher's, 23 miles long by 5 broad, tapering in the south-east to a long narrow peninsula, consists of a single peak, Mount Misery, 3,700 feet high, with gentle slopes formed by old lava streams deeply furrowed by the floods of the rainy seasons. The slopes are very fertile, and the alternating forests and cane fields produce a most pleasing effect. There are hot springs in several places which emit sulphurous vapours. This is the oldest British settlement in the West Indies, having been founded in 1623; but on account of an amicable arrangement for its division between the British and French, it was for a long time a "bone of contention" between the two nationalities. The chief town is *Basseterre*, at the junction of the long peninsula with the main island. The chief products are sugar, molasses, and rum, arrowroot, coffee, cacao and tobacco.

Nevis is joined to St. Kitt's for administrative purposes, and is only separated naturally by a narrow strait. It is about eight miles in diameter, and consists of a single volcanic mountain rising from the sea to an elevation of 3,200 feet, with fertile land on the slopes. The only town is *Charlestown*, and its products are sugar and salt.

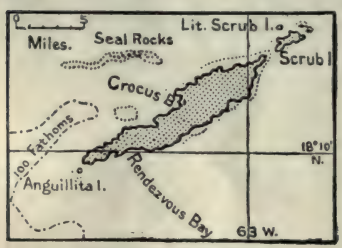

FIG. 381.—*Anguilla.*

Anguilla is also included in the same administration. It is 16 miles long by 3 broad, its name meaning "eel," having reference to its long narrow and curved form. Its exports are phosphate of lime and salt, and there is a small town called *Rode Bay*. The small islands called The Dogs are dependencies of Anguilla.

FRENCH WEST INDIES

By M. Zimmermann.

The French West Indies.—The main group of the French West Indies occupies the portion of the Lesser Antilles between 14½ and 16½° N.; it includes the islands of Martinique, Guadeloupe, Marie Galante, and

Desirade of which only the two first are important; and there are also the islands of St. Martin and St. Bartholomew in 18° N. These are all that remain to France of its flourishing West Indian settlements of the seventeenth century. **Guadeloupe** is composed of a volcanic island, Grande Terre, and a coral island, Basse Terre, united by a narrow isthmus, while **Martinique** is purely volcanic. Both are exposed to hurricanes and earthquakes, and the eruption of Mont Pelée on Martinique in 1902 wiped out the seaport town of *St. Pierre* and destroyed 30,000 people. Both islands are undergoing a serious economic crisis; their former sources of wealth, sugar and rum, have been unable to compete with the products of the beet. The trade of Guadeloupe diminished by one-third between 1878 and 1898, and Martinique is no better off. Efforts have been made to restore prosperity by the cultivation of cacao, tobacco, and especially pine-apples and bananas. The population is very dense on both islands; the negroes and mulattoes have entirely taken the place of the old planters.

WINDWARD ISLANDS

British Windward Islands.—South of Martinique comes the federation of the Windward Islands, which includes St. Lucia, St. Vincent, Grenada, and the Grenadines. The total area of these islands slightly exceeds 500 square miles, and of their population less than five per cent. are whites.

FIG. 382.—*Badge of the Windward Islands*

St. Lucia is 24 miles long by 12 broad; it is of volcanic formation, very picturesque from the fantastic shapes of the rocks. The soil is decomposed lava and very fertile. A volcanic crater with a fuming soufrière is among the sights of the island. The scenery is of peculiar beauty, and Castries on the north-west, with its two peaks 3,000 feet high, called the Pitons, can hardly be equalled in grandeur. The harbour of Castries is probably the finest in the West Indies, and has been adopted as a naval station. The people are mostly black and coloured, and speak a French patois similar to that of Dominica, but English is generally understood. The island was settled mainly by the French, but it was taken and given up again several times by the British before it finally came into their possession in 1803. *Castries*, on its fine harbour, is the capital; the town of *Soufrière* lies on a less important bay in the north-west. The exports are sugar, cacao, logwood and spices.

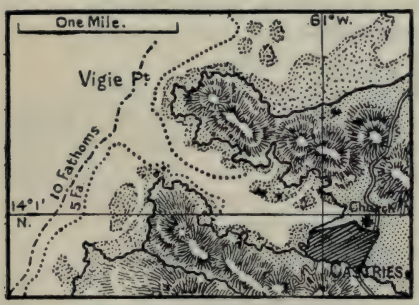

FIG. 383.—*Castries Harbour.*

St. Vincent is 18 miles long by 11 broad. A stretch of volcanic hills forms the backbone of the island, and extends here and there into spurs with rich valleys between them. The highest peak is the Morne à Garou, 4,000 feet ; the Soufrière, 3,000 feet, is an active volcano. In 1812 a most disastrous eruption took place, which utterly ruined the greater part of the cultivation, and in 1902 eruptions did immense damage. Between the two mountains there is a lake nearly a mile in diameter, occupying the crater of an extinct volcano, and without either inlet or outflow. In early times the island was left in the hands of the Caribs, and was afterwards alternately French and British. The Caribs were, however, so troublesome to the settlers that in 1796 the British authorities deported them, to the number of 5,000, to the island of Rattan, off the coast of Honduras. The chief exports are sugar, rum, cacao, spices and arrowroot. The capital, *Kingstown*, is situated on an extensive harbour in the south-west.

The **Grenadines**, a line of small islands, extends between St. Vincent and Grenada. Bequia belongs to St. Vincent, and is long and narrow, with an area of six square miles ; being badly watered, however, it is not favourable to settlement. Carriacou, Union, and Mustique belong to Grenada.

Grenada is 21 miles long and 12 broad, rugged and picturesque in scenery, and traversed from north to south by an irregular mass of volcanic mountains, the highest, Mount St. Catherine, rising to 2,750 feet. The island contains several small but picturesque crater lakes. The soil is a dark mould, very fertile, especially in the valleys. Unlike the other islands, it has ceased to grow sugar, which has been replaced by cacao, which forms a valuable export, as well as coffee, kola and spices ; the colony has been called "The Spice Island of the West." Fruit and vegetables are also grown for the markets of Barbados and Trinidad. Grenada was ceded to Great Britain in 1783, after being in the hands of the French for over a century, and the Creole patois is commonly spoken. Of the population much less than one per cent. are whites. *St. George's*, the capital, stands on a fine harbour in the south-west.

BARBADOS

Barbados, the most easterly of the West Indies, is 21 miles long by 14 broad, and lies 100 miles east of St. Vincent. It was partly federated with the Windward Islands until 1885, when it was entirely separated, and is now a distinct colony. The island is lower than most of the others, the highest elevation being only 1,145 feet. Surrounded by coral reefs, its formation is Tertiary sandstone and limestone, probably raised by volcanic agency. A kind of bitumen called *manjak* is now being mined and utilised, and a crude petroleum known as Barbados tar has long been collected and used as a medicine. There are numerous springs, some of which are impregnated with mineral substances, but no rivers. The soil is so fertile and so free from rocks that there is very little waste land in

the island. It was first settled by the British in 1625, and it enjoys the unique position of having never been in the possession of any other nation. The whites once preponderated, and by them Virginia and Jamaica were largely colonised. At present only about 10 per cent. of the inhabitants are white. The density of population, 1,120 per square mile, is perhaps unique for any separately governed colony or State. Barbados has never experienced the difficulty so conspicuous in the other colonies of want of labour; even the emancipation caused but little distress. Sugar has always been the staple product, and now that the price is so low the island is passing through a period of depression hardly known before. The English language is universally spoken, and the Barbadian is proud of his connection with the mother country. His island is "Little England," and he is "neither Carib nor Creole, but true Barbadian born." The constitution is old and on the lines of the mother country; the Governor represents the King, the Legislative Council the Lords, and the House of Assembly the Commons. *Bridgetown*, the capital, stands on the shore of an open roadstead named Carlisle Bay, in the south-west, and a railway runs thence round the south and east of the island.

TRINIDAD

Trinidad is only separated from the continent by narrow straits, and physically belongs to South America rather than to the West Indies, its mountains being the continuation of the Venezuelan system. Next to Jamaica it is the largest of the British West Indian Islands, being 48 miles long by 35 broad. It is generally level, but three chains of hills run across it from east to west; that in the north, the termination of the Venezuelan Coast Range, is the highest, reaching a maximum of about 3,000 feet. The most remarkable feature is the Pitch Lake at La Brea, in the south-west, which was known from a very early period, for even the buccaneers caulked their ships with its asphalt or bitumen. The lake covers about ninety acres, and its product is a valuable article of export, being largely used for pavements.

FIG. 384.—*Trinidad.*

FIG. 385.—*Badge of Trinidad.*

The climate is hot and damp, but agreeable, the soil fertile and capable of growing all tropical products. The forest, which covers a large part of the island, is valuable for its timbers, and, like that of the neighbouring mainland, is very interesting botanically. The island was discovered by Columbus in 1498, and was colonised to a small extent by the Spaniards, who continued to possess it till 1797, when it was con-

quered by Great Britain. Remnants of Spanish laws still exist, and the Spanish language is spoken to some extent; but on account of a French immigration, which took place in 1783 and following years, the Creole French patois is more prevalent. English is, however, generally understood. Together with the island of Tobago it forms a Crown colony; it is administered by a Governor, Executive Council, and Legislative Council. The inhabitants consist of black and coloured people, with a small proportion of whites, East Indians who have been imported as labourers to the great benefit of the colony, and a few Chinese.

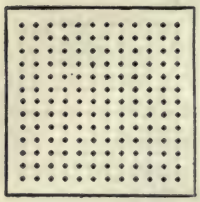

FIG. 386.—*Average population of a square mile of Trinidad.*

The chief products are sugar, cacao, and asphalt, and, like the other sugar colonies, it is much depressed at present from the low price of its staple; less so than others, however, for Trinidad cacao is an exceedingly valuable product. There are about eighty miles of railway open on the island connecting *Port of Spain*, the capital, in the north-west, with *San Fernando*, in the south-west, and with the interior.

Tobago lies about 20 miles north-east of Trinidad, and is 26 miles long by 7½ broad. Its formation is volcanic, with conical hills and ridges rising to a height of 1,800 feet. It exports sugar, coco-nuts and live stock from the little town of *Scarborough*, on the south coast.

STATISTICS OF BRITISH WEST INDIES.

Colony.	Bahamas.	Jamaica and Turks Islands.	Leeward Islands.	Windward Islands.	Barbados.	Trinidad and Tobago.
Area, square miles ..	4,466 ..	4,372 ..	704 ..	509 ..	166 ..	1,868
Population, 1881 ..	43,521 ..	585,536 ..	122,046 ..	121,502 ..	171,860 ..	171,179
,, 1891 ..	47,565 ..	644,235 ..	127,723 ..	136,483 ..	182,306 ..	200,028
,, 1901 ..	54,358 ..	771,900 ..	127,440 ..	162,800 ..	195,600 ..	279,700
Density of pop. 1901	12 ..	177 ..	181 ..	320 ..	1,180 ..	150
Annual exports :—						
Average, 1871–75 ..	135,000 ..	1,364,000 ..	482,000 ..	539,000 ..	1,193,000 ..	1,613,000
,, 1881–85 ..	145,000 ..	1,445,000 ..	545,000 ..	508,000 ..	1,159,000 ..	2,503,000
,, 1891–95 ..	127,000 ..	1,896,000 ..	457,000 ..	515,000 ..	911,000 ..	2,157,000
Annual imports :—						
Average, 1871–75 ..	203,000 ..	1,654,000 ..	430,000 ..	419,000 ..	1,149,000 ..	1,381,000
,, 1881–85 ..	207,000 ..	1,500,000 ..	463,000 ..	407,000 ..	1,097,000 ..	2,566,000
,, 1891–95 ..	185,000 ..	2,094,000 ..	442,000 ..	446,000 ..	1,151,000 ..	2,195,000

PRINCIPAL TOWNS.

Town.	Colony.	Population, 1881.	Population, 1891
Nassau	Bahamas ..	ca. 5,000 ..	ca. 5,000
Kingston	Jamaica ..	38,566 ..	48,504
St. John, Antigua ..	Leeward Islands ..	ca. 10,000 ..	9,738
St. George's, Grenada	Windward Islands ..	ca. 5,000 ..	ca. 5,000
Bridgetown	Barbados ..	20,947 ..	21,000
Port of Spain	Trinidad ..	31,858 ..	33,273

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CHAPTER XLIII.—THE CONTINENT OF SOUTH AMERICA

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Position and Outline.—South America is little less in area than North America. Its seven million square miles form nearly one-seventh of the land surface of the globe. The greater part of the continent lies south of the equator. The northern point, Punta Gallinas, lies in 12½° N. (the latitude of Gambia), and the southern point, Cape Horn, in 56° S. (corresponding to the position of Edinburgh in 56° N.). The extreme east point, Cape Branco, is in 35° W., and the extreme west point is Punta Pariña, which lies a little further west than 81° W., the continent as a whole lying farther east than North America.

South America is almost surrounded by the ocean: by the Atlantic on the north and east, and by the Pacific on the west; and it is joined to Central America only by the narrow isthmus of Panama, about 45 miles wide. The continent as seen on a globe has a roughly triangular shape, without notable peninsulas and with few islands—less than one per cent. of the area is insular. In this respect it is even more compact than Africa. The South American coast line is not quite twice as long as the minimum line that could circumscribe its area, which is a greater proportion than that found in Africa. The fjords of the south-west are the chief source of the relatively more extended coast line of South America. Nevertheless, the coast line is only three-quarters as long as that of Europe, whose area is little more than half as great.

Coasts.—The north coast borders the Caribbean Sea, which forms two gulfs, that of Darien in the west, and that of Venezuela in the centre, the latter opening into the lagoon of Maracaibo. The water of this lagoon is fresh in the south, but brackish in the north, where it is partly separated from the sea by a bar from six to twelve feet below the surface. The coast here is low and sandy, but it is steep on the west coast of the lagoon, where the mountains approach the sea. Curaçoa, Margarita, and other islands off the north coast are sometimes named the Leeward Islands, but they must not be confused with the group of British West Indian possessions so named. Trinidad lies as a detached part of the continent off the eastern point of this northern coast, which trends south-east beyond it. South of Trinidad the great delta of the Orinoco forms a flat coast, and this continues to be the nature of the Atlantic shores throughout

Guiana, which is bordered by a flat coastal plain. The coast south of the Amazon is broken only by the Gulfs of São Marcos and Bahia, but it is bordered by a sandstone reef as far as 20° S. Beyond this, as far as the mouth of the Rio de La Plata, a series of lagoons run parallel to the sandy coast, except in the mountainous region between Cape Frio and Santos, which is of the Dalmatian type, and contains the magnificent harbour of Rio de Janeiro (Fig. 426). The Patagonian tableland forms a steep, though not lofty coast, with numerous gentle outcurves and incurves of which the bays Blanca, San Matias and San Jorge are the chief. The Falkland Islands rise from the continental shelf to the east. South of 42° S. there is a fjord coast in the west, which is bordered by numerous islands. The great island of Tierra del Fuego is separated from the mainland by a series of fjords forming the Strait of Magellan (Fig. 405). Queen Adelaide Archipelago, Wellington Island, Chonos Archipelago, and Chiloe Island are the most important masses of land separated from the mainland by the western channels. North of this the coast is steep, with few breaks. It runs almost due north to 18° S., then north-west to Punta Pariña, north of which comes the one large bay on this long coast line, the Gulf of Guayaquil.

Configuration—Chief Divisions.—The mean elevation of South America, approximately 2,000 feet, is the same as that of North America and of Africa. But the vertical distribution of its land differs in character from that of these two continents. South America is distinguished for the large proportion of its area under 600 feet (42 per cent.), and also for the relatively large proportion over 10,000 feet (6 per cent.), which is only exceeded in Asia.

FIG. 387.—*Configuration of South America.*

Three elevated areas stand out clearly in the structure of the continent: (1) The Western Cordillera; (2) the Guiana Highland; (3) the Brazilian Highland. The flat Orinoco plain lies between the Cordillera and the Guiana Highland; the great Amazon plain is bounded by all three; and the Paraguay-Parana plain stretches from the Cordillera to the Brazilian Highland and the sea. The Guiana and Brazilian Highlands possess many similar characteristics, and may be viewed as one area—the Eastern Highlands—broken into two parts by the Amazon Valley. There are thus three great natural regions in the continent: The Eastern Highlands; the Central Lowlands; and the Western Cordillera.

The Eastern Highlands.—The Eastern Highlands of South America form one of the ancient land masses of the Earth's surface. Their basis is of Archæan and old Palæozoic rocks, covered with sandstones, the age of which is uncertain owing to the absence of fossils. They are not of

marine origin, and are perhaps Palæozoic, perhaps Cretaceous in the north. They are probably Cretaceous in the centre and south, but it is quite possible that some of the southern rocks may be of Triassic age. Too little is known about the geology of the interior to justify definite statements. In the south, coal-bearing layers lie over the Carboniferous or Permian conglomerate, and contain a *glossopteris* flora. This resembles a series of similar rocks, similarly situated in South Africa, India and Australia, and suggests the possible existence of ancient continental connections. Narrow strips of Cretaceous and Tertiary rocks skirt the coast. In the Eastern Highlands no folding of the strata has occurred since Palæozoic times, and the faultings have produced the masses of table-shaped mountains, and erosion by running water the valley landscapes.

The Eastern Highlands vary from 1,000 to 3,000 or 4,000 feet in average elevation, and are loftiest in the north and in the south, while the centre is a hollow, forming the lower valley of the Amazon. The Brazil Highland reaches nearly 8,500 feet near the tropic, where the average elevation is between 4,000 and 5,000 feet. This loftier region is close to the coast, and the long rivers therefore flow west like the Rio Grande and other streams running to the Parana, the São Francisco, the Paranahyba, and the Tocantins, and its great tributary the Araguaya. South of the tropic the highland is lower and narrower. The Guiana Highland is highest in the west, where the maximum height is supposed to be 11,000 feet in Icutu. The Branco, a tributary of the Rio Negro flowing southwards, and the Essequibo flowing northwards separate this higher region from the lower land on the east. Here, as in Brazil, typical table mountains and terraces have been formed in the horizontally bedded rocks.

The Central Lowlands.—The Central Lowlands may be divided into two areas : the Patagonia-Pampa Area and the Area of Great River Basins, the latter consisting of three regions ; the basins respectively of the La Plata, the Amazon, and the Orinoco.

The Patagonia-Pampa Area consists of the low Patagonian plateau, and the still lower Pampa region north of the Rio Colorado, the waters of which do not reach the sea. Both are composed of a sandy clayey marl of Tertiary age, recalling the *mollasse* of Switzerland, through which basalt flows have pierced, over which glacial waste has been spread, and loess blown, which in many places is weathered into loam. No foldings or faultings occur in these strata, where Darwin found many remains of giant mammals. The pampa, however, is crossed by folded outliers of the Western Cordillera, composed mainly of ancient crystalline rocks.

The Great Basin Area occupies about two-thirds of the continent. The three basins are not all of the same age, and each has its special characteristics.

The La Plata lowland consists of a flood plain formed by the river alluvium covering the glacial morainic and inter-glacial loess and loam which here and there are found on the surface. The rivers rise in the

higher regions surrounding this lowland. The Uruguay drains the lower part of the Brazilian highland, in the higher tropical regions of which the Parana and its tributaries rise, the Paraguay flows from the Matto Grosso heights, and its headwaters are only a mile or two removed from those of tributaries of the Amazon, and three great rivers flow south-eastward from the Bolivian plateau.

The main stream of the Amazon flows in alluvium of its own moulding which is bordered by Tertiary layers, which may have been formed in brackish water before the mighty stream extended its flood plain so far to the east. The navigable Marañon and Ucayali from the Andes join at Nauta, about 1,800 miles from the Atlantic, but only 370 feet above the sea level. The southern tributaries come from the Andes, the divide with the Paraguay, or the Brazilian highland. They are themselves mighty rivers, with falls between 10° and 8° S., above and below which they are navigable. The northern tributaries also have falls and rapids in their middle course. The main stream flows south of the equator, which it reaches only at its mouth. The basin narrows in this region, and the river forms a great estuary, up which powerful tidal bores rush. Although the Amazon is by no means the longest river in the world, its basin is the largest, and the water it conveys to the sea the greatest of any river, a fact easily explained by the heavy tropical rains which fall over most of the drainage area.

Very little is yet known about the geology of the Orinoco basin. The river rises in the loftier western region of Guiana. The upper waters of the river divide, and part flows by the Cassiquiare south-west to the Rio Negro, a tributary of the Amazon, while the rest sweeps in a curve round the base of the Guiana highland, and forms a great delta. The river receives many tributaries from Guiana and also from the eastern ranges of the Colombian and the southern slopes of the Venezuelan Cordillera.

The Western Cordillera or Andes.—The Andes, forming the mountainous western portion of South America, run from south to north with increasing breadth as far as 18° S., and then curve almost in a semi-circle convex to the west, so that the northern ranges border the north-west of the continent. This semicircular belt is low and narrow in the region where the Gulf of Guayaquil cuts into the coast; and at that point the tectonic character of the mountains alters, allowing a distinction to be drawn between the Main Cordillera south of 4° S. and the Northern Cordillera north of that latitude.

The Main Cordillera of the Andes is comparatively simple as far north as Aconcagua, its highest summit (23,080 feet). A main range rises from the plains in the east. A line of heights borders the Pacific, separated by a great parallel longitudinal valley from the main range. In the south, where glaciation has been great, this valley becomes submerged, and is represented by a series of sounds; in the north it is filled by recent geological deposits and forms the fertile valley of Chile. The glaciated region south of 38° S. is cut up by many fjords which divide the western

heights into great islands and peninsulas. In the extreme south the mountains trend east and west. The southern Andes consist of granite with a band of Cretaceous rocks in the east, and must be distinguished from the rest of the Main Cordillera north of 40° S. From 40° S. to 4° S. the western and eastern regions of the Cordillera differ both in composition and age. The eastern ranges contain Archæan, Palæozoic, and petroleum-bearing Mesozoic rocks probably of Cretaceous age. The eastern ranges were folded earlier than the western ranges, where the folds are more marked. Besides old crystalline rocks the western ranges contain Jurassic and porphyritic rocks of similar age folded together. Both are remarkable, the Jurassic because they are the only marine sediments of that age south of the equator, the porphyritic, so called by Darwin, who first described them, because they are the only evidence we possess of volcanic activity in Mesozoic times except in the oldest Triassic strata. A series of young volcanic rocks comes between the eastern and western regions ; and along a line which clings to the eastern foot of the western or main range, there are numerous active volcanoes.

The western and eastern ranges include between them a plateau. The eastern ranges in the south have a more or less meridianal trend, but traces of them can be found in the Pampean ranges, in the mountains of Cordoba, Tandil, and Ventana. In the north, on the other hand, they strike from north-west to south-east, and can be traced in the heights of S. Miguel west of the Paraguaya in 18° S. The Plateau can be divided into three regions—the smaller or Argentine region, part of the inland drainage area of the Pampa ; the central or Bolivian plateau, an intermont basin with its own drainage system to Lake Titicaca ; and the northern or Peruvian region drained to the Amazon. It was for a long time suspected that the Andes might be proved to attain their greatest height on the eastern side of Lake Titicaca, but the researches of Sir Martin Conway in 1898 showed that this is not the case. The peaks of Mount Sorata (Ancohuma and Illampu) do not reach 22,000 feet, nor is that altitude surpassed by Illimani.

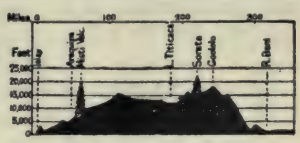

FIG. 388.—*Section across the Andes.*

The western range remains uniform in structure throughout its vast length, but the southern part lies parallel to the meridian, whereas the northern part strikes from south-east to north-west, and disappears about 4° S.

The Northern Cordillera begins at the point of disappearance of the main western chain. Here the marine Jurassic and the porphyritic rocks are comparatively rare. The Palæozoic rocks of the eastern ranges are also absent in the north, where Archæan and Cretaceous rocks predominate. From Loja to the Knot of Pasto the Ecuadorian Andes form two chains, with many giant volcanoes, separated by a narrow but lofty plateau (Fig. 397). North of Pasto the Cordillera is divided into four chains, with deep valleys between, through which large rivers flow to the north and north-east.

The Eastern Colombian Range divides, and one branch flanks the Gulf of Maracaibo, while the other runs eastward along the coast as the Caribbean or Venezuelan Range, whose continuation can be traced in Trinidad, Barbados, eastern Guadeloupe, Porto Rico, and Cuba.

Climate.—The greater part of South America has a tropical climate, subtropical and temperate conditions occurring only in the south. The lofty western mountains divide the country into two very different climatic areas, the west ruled by the Pacific, the east more dependent on the Atlantic. South America is distinguished from other continents by not having a marked continental climate, for the term can be applied only to the pampa region west of the Plata estuary. At all seasons the isotherms in the west run on the whole from north-west to south-east. West of the Cordilleras the temperature of the north-eastern region is always a little over or under 75° F., but the centre of highest temperature follows the Sun, and in the south-east the summer isotherms are convex to the south, while those of winter follow the parallels of latitude.

FIG. 389.—*Isotherms of South America for January.*

FIG. 390.—*Isotherms of South America for July.*

This distribution of temperature is explained by the study of the prevailing winds and ocean currents. Much of the west coast lies on the east side of the South Pacific subtropical high pressure area; all the winds have a component directing them northwards, and the winds drive the surface waters in a northerly direction, and also cause an upwelling of colder water from below. Hence the waters near the coast are relatively cold, and the air is also relatively cool at all seasons. The extreme north and south are not affected by this *régime*. The tropical regions are warmer in the north in the northern summer and in the south in the southern summer. The centre of low pressure has a synchronous movement, and ocean winds penetrate to the heart of the continent in summer, and clouds screen the land from the burning Sun. In winter the south-east of South America lies in the west of an anti-cyclone, and at all seasons the currents off most of the east coast flow from equatorial regions and are warm. The contrast between the climate on the east and west sides of a high pressure area are well illustrated in South America.

The rainfall is also dominated by the conditions just described. In the anti-cyclonic areas of the west coast practically no rain falls, even although

the air is often saturated with water vapour near the coast, forming winter mists. This is partly due to the rapidly rising temperature gradient from the coast inland, when the humidity is low. North of 4° S. both temperature and rainfall increase. In Guayaquil rain falls from December to May, and round Buenaventura the scanty, and perhaps not quite trustworthy, records show enormous precipitation almost every month of the year. The westerly storm winds bring much rain to the western slopes of the southern mountains at all seasons, and the northern limit of these storm rains sways north and south with the Sun. The south-east is dry all the year, but north of the Plata estuary the summer rains characteristic of inter-tropical and sub-tropical regions prevail. The equatorial double rainy season is not well marked in South America save in the equatorial mountainous regions. This resembles the Indian monsoon rains, and is due to the hot low pressure area formed round the southern tropic in summer causing an inflowing of winds from the north, which moisten the Guianas and the north of the Brazilian plateau; the dry period of inter-tropical South America occurs when the vertical midday Sun has moved southward from the northern tropic, but is still overhead at noon north of the equator. In the interior of the north-east of the Brazilian highland there is hardly any rain in winter. The lowlands north of 4° N. have less abundant rains than the other inter-tropical regions.

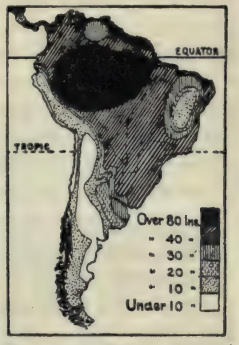

FIG. 391.—*Mean Annual Rainfall of South America.*

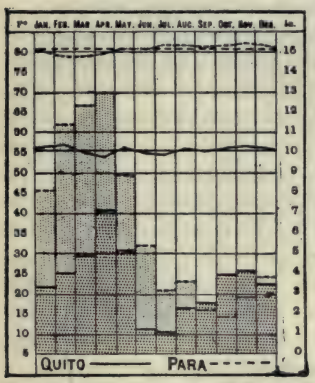

FIG. 392.—*Temperature and Rainfall of Tropical South America.*

The influence of the heavy rains on the increase of the eroding powers of rivers is beautifully illustrated in two regions. In the south-west the rivers have cut into the Cordillera until their valleys are so deep that they pass east of the main line of heights and drain the eastern slopes. The reverse has occurred in equatorial regions, where the rainfall is heaviest in the east, and the upper waters of the Amazon and its tributaries flow in the heart of the mountains. The lowering and narrowing of the ridge near 4° S. is probably partly due to excessive erosion.

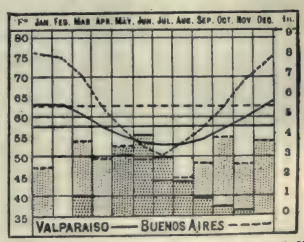

FIG. 393.—*Temperature and Rainfall of Temperate South America.*

Minerals and Soils.—South America abounds in minerals. The Guianas, the Eldorado of the early voyagers, are rich in gold; the Brazilian gold and diamonds developed in the schists, but usually found in conglomerates or rock waste, attracted early explorers. Iron, copper, lead, bismuth, antimony, and other metals, as well as precious stones, are sought for and obtained. The gold and silver mines of the Andes have yielded treasure for centuries, and are not yet exhausted. The Potosí mines alone have supplied over three hundred million pounds sterling worth of silver since the Spaniards first took possession of them.

Laterite covers most of Brazil and Guiana. The Orinoco and Amazon valleys consist largely of recent alluvium, which exists in the lowlands through which the other rivers pass. Patagonia is covered mainly with glacial waste, and loess and loam are found over the pampa and parts of the Plata basin, and even as far south as the Amazon. Much rough rock waste clings to the mountain sides, and along the young volcanic strip fertile volcanic soil is found. The dry western coast lands are covered with shifting sands, and in the south with loam. Salt deposits are common in the pampa and in the Atacama desert, whence nitrates are exported.

Flora.—The rainfall and vegetation maps of South America present many resemblances if the higher mountainous regions, which have a succession of floral regions running up to the snow-line, are excluded. The south-east Patagonian region covered with glacial waste is characterised by dwarf plants suited to the dry climate. This passes into a rich grass-steppe land in the north round the Plata estuary, and into a poor salt steppe inland nearer the foot of the Andes, in the drier districts where the extremes of temperature are at a maximum. The grass steppe of the pampa has woods along the water-courses, and the intermediate land covered with a thick carpet of grasses, composites, and papilionaceous plants. Further north trees are much more plentiful, and are largely evergreen, and once more we have to separate the moister, richer lands of the coast from the drier regions nearer the Andes, which forms the Gran Chaco, or "great hunting ground." This is a subtropical region where palms flourish. The maté or Paraguay tea (*Ilex paraguayensis*) is found in the eastern region; and the wax palm (*Copernica cerifera*) is typical of the whole Chaco. In eastern Brazil the savanna area is divided into a southern Campos region, where grasses often three or four feet high predominate, and a northern Catingas or "light woods" region, with a dry climate and thorny bushes. The Matto Grosso—the "great woods"—region belongs to the savanna area. The Beni region is probably also a savanna land with lower rainfall than the surrounding regions.

Most of the lowland of the basin of the Amazon is covered with dense tropical jungle—giant trees to whose tops strong lianas climb while round their base thick impenetrable underwood abounds. These Selvas, as the tropical forests are called, are the area of densest vegetation on the globe, and they persist owing to the abundant rains which fall most of the year

and the never failing high temperature. Palms, mimosas, figs, bamboos are among the characteristic trees, over which bignoniaceous and other creepers twine, among whose branches epiphytes, including gorgeous orchids, flourish, while in the pools of water the Victoria regia spreads its great leaves and opens its gorgeous flowers.

North and west of the Orinoco, where the rainfall is scantier, are savannas, here called llanos, with tall grasses and isolated trees, many of them palms. Savannas also characterise the northern plains of Colombia.

The rainy northern part of the west coast has dense tropical forests, the rainless region is a desert, and temperate forests cover the hillsides watered by the rains accompanying the westerly storm-winds. Occasionally in the desert area scrubby olives, tamarinds, and mimosas are found, but in the Atacama desert almost no vegetation exists, except here and there a miserable acacia bush. The temperate forest contains araucarias and conifers; but there is a gradual change in the north to the desert conditions, and in the south to the dwarf beech and other bushes of southern Patagonia and Tierra del Fuego.

The Cordilleras contain many desert regions, here and there bush is formed when the moisture suffices, in the north Stipa and other hard grasses form the Puna region. The eastern slopes over 5,000 feet (the *tierra templada*), where rain is more abundant, have beautiful tree ferns, and the invaluable cinchona tree flourishes in the forests.

Quinine from the cinchona, cocaine from the coca, are among the medicines obtained from South America. Maté and cacao, with their valuable alkaloids, potatoes and tapioca, maize and tobacco, india-rubber and a variety of gums and wax, in addition to much valuable and beautiful timber mainly used by the cabinetmaker, are largely exported to Europe. The earth nut, Brazil nut, Spanish pepper, yams, batatas, and many other products of the forests and fields are abundant. Among the plants introduced within the last four centuries are rice, sugar, arrowroot, agave, cotton, coffee and others that flourish in inter-tropical regions.

Fauna.—South America forms a separate faunal region with a characteristic series of animal forms, exhibiting different association of animals with the different plant groups, forming a physiological rather than a morphological unity. The tamed llama and alpaca of the Chilean region are among the useful native animals of South America. At the time of the Spanish conquest dogs were used by the natives; and the Incas protected the birds whose deposits formed the great guano wealth. Most of the other useful animals have been introduced. Horses flourish on llanos and pampa, cattle are found in the wetter, and sheep in the drier and colder regions of the southern grass lands, and pigs are plentiful, many of them half wild.

People.—South America has, at a rough estimate, 37½ million inhabitants, giving a mean density of population of 53 per square mile. The

coastal lands, the river valleys, especially the alluvial plains of the Plata basin, are the most densely peopled. The inhabitants of the interior of the forest regions and in Patagonia consist mainly of aborigines, of many races differing in language more than in racial characteristics. The natives of the warmer regions are yellower than the brown inhabitants of the mountains, but all possess the same dark, lank hair and scantiness of beard. The Caribs of the lower, the Nu-Aruak of the upper Amazon, the Tupi between the Amazon and Plata, and the Guaykuru of the Paraguay, the Ges of eastern Brazil, and the Patagonians and Fuegians of the south are among the most important of their races east of the Andes. The Araucanians of Chile, the old civilised Quichua, who formed the Inca State overthrown by the Spaniards, and the Chibcha of Colombia are among the Andean tribes. The name Andes was itself derived from the tribe of the Antis. The inhabitants of the more densely peopled areas are of European and African origin as well as American. Pure whites, negroes, and yellow men exist, but the majority are of mixed race; so that here, as Reclus has pointed out, men containing the greatest number of characteristics of all races can be found, the most typical average specimens of humanity.

History.—At the end of the fifteenth century the Chibcha of Colombia, the Aymara and other Peruvian tribes, under the Incas of Cuzco, were in a relatively high state of civilisation, but could not resist the Spanish invaders, who had more difficulty in overcoming the Araucanians of Chile, a people who still form an important element of the population in the south-west. With these the Spaniards have mixed, and also in the Plata basin with the natives of the Gran Chaco and Verua. When Pope Alexander VI. divided the world between Spain and Portugal the latter received only the eastern tip of Brazil, but by the Treaty of Tordesillas in 1494 the boundary was moved westwards and passed from the mouth of the Amazon due south. The Spanish conquered from the west, the Portuguese from the east. Here the Portuguese settled and soon introduced negroes from Africa to carry on the manual work. Slaves continued to be imported for over three centuries, and a large black element is found in the east from the Plata to Darien, but is most numerous in Brazil and the Guianas. In this region the greatest miscegination has taken place; and the complications have been increased in British Guiana in recent years by the immigration of Hindu coolies. A steady stream of Italian emigrants seeks the east of South America, and British, German, and French settlers are found there and in the south-west.

For three hundred years Spain was overlord of the continent outside Brazil and part of the Guianas; but in the first quarter of the nineteenth century the Spanish yoke was thrown off and various federal republics were formed on the model of the United States—an indirect outcome of the establishment of the Napoleonic Empire in Europe. In 1889 the Empire of Brazil also became a federal republic. Racial as well as

personal rivalries have had much to do with the state of recurring revolution which characterises the Latin American republics.

Few of the national boundaries in South America were definitely fixed until about the close of the nineteenth century, and boundary disputes were frequently the cause of revolution and war. Recently, however, most of the acute frontier difficulties have been settled by arbitration.

The religion of the whole continent, save for a few unconverted savages, is Roman Catholic; the social and public life is derived from that of Spain and Portugal.

THE COUNTRIES OF SOUTH AMERICA.

Country.	Area sq. miles.	Pop.	Country.	Area sq. miles.	Pop.
Brazil	3,210,000	14,332,000 (1890)	Ecuador	118,630	1,204,200 —
Argentina ..	1,136,000	4,894,000 (1900)	Paraguay ..	97,722	330,000 (1887)
Bolivia	515,130	2,520,000 (1893)	British Guiana ..	88,650	278,000 (1891)
Colombia ..	513,850	3,320,500 —	Uruguay	72,170	793,000 (1893)
Peru	439,000	2,629,600 (1876)	Dutch Guiana ..	46,000	70,500 (1892)
Venezuela ..	594,000	2,323,500 (1891)	French Guiana ..	30,460	29,600 —
Chile	290,820	2,963,700 —	Falkland Islands	6,500	2,000 (1901)

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CHAPTER XLIV.—THE ANDEAN COUNTRIES

I.—COLOMBIA

By Dr. Fritz Regel,[1]
Professor of Geography in the University of Würzburg.

Position, Extent and Coasts.—The Republic of Colombia occupies the north-west of South America, and its former department of Panama, now a separate republic, gave it a share of Central America bordering on Costa Rica. It is bordered by the Caribbean Sea in the north and by the Pacific Ocean on the west. On the south its frontier is principally with Ecuador, except between 70° and 73° W. long., where the Marañon separates it from Peru. On the east from about 4° S. to 4° N. lat. it touches Brazil, and thence northward to the sea in 12° N., Colombia marches with Venezuela. The short frontier towards Costa Rica, and that towards Venezuela, determined in 1891 by Spanish arbitration, are the only boundaries as yet definitely fixed; on the other borders, Ecuador claims a broad strip on the south, Peru claims the south-east corner, and the Brazilian border is by no means definite. The small islands of the south coast of Panama also form part of Colombia.

Configuration.—The Isthmus of Panama is occupied by fairly high mountains, the Cordilleras of Chiriqui, of Veragua, and of San Blas, composed of crystalline schists and recent eruptive rocks; and they are only loosely connected through the Isthmus of Darien with the most westerly ranges of the Andean system. The South American portion of the country may be divided into the Andes region, and the great plains of the east.

The Andes Region contains four mountain chains: (1) The still almost unexplored coast-range or Cordillera del Chocó begins in latitude 4½° N. on the Gulf of Buena Ventura, and is defined on the east by the valleys of the Rio San Juan and Atrato. (2) The Western Cordillera the direct continuation of the western range of Ecuador, forms a long stretch of mountain wall, bearing the high summits of Cerro Munchique, 10,000 feet, and the Farrallones of Cali and Citará, 11,000 feet; further north near Paramillo (about 11,000 feet), the range breaks up into several spurs which sink to the low ground of Bolivar. The eastern border is marked by an inter-Andean depression, occupied in the south by the Rio Patia and in the north by the Cauca. (3) The Central Cordillera is the continuation of the inner or eastern Cordillera of Ecuador, and extends between the Cauca and the Magdalena valleys. The southern portion is characterised by lofty volcanoes built up of andesitic lavas, tuffs and ashes, including Pasto, 8,350

[1] Translated from the German by the Editor.

feet; Cumbél, 16,000 feet; the Sugar Loaf, 16,000 feet; Puracá, Huila, Tolima, 18,300 feet; Santa Isabél and Ruiz, whose broad snowy dome is the most northerly of the giant volcanoes of the Cordillera, and rises almost as high as the graceful cone of Tolima. The range, which is composed mainly of crystalline schists, sinks and broadens into the highlands of Antioquia, the northern spurs of which occupy the space between the Cauca, Neohi and Magdalena; although falling to the level of the northern plain, they are prolonged structurally to the snowy heights of the Sierra de Santa Marta on the coast. (4) The Eastern Cordillera, or Cordillera of Bogotá, adjoins the Cordillera of Ecuador as a separate mountain system in the south of Colombia, and bears almost the same relation to the Central and Western Cordilleras as the range of the Jura does to the Alps. It contains no volcanoes, and crystalline schists only appear in the north, the range as a whole being built up of strongly folded Cretaceous and Tertiary strata. Occasional plateaux, like that of Bogotá, are covered with more recent sediments. The Cordillera of Bogotá splits up towards the north, the western fork, called the Cordillera of Perijá, runs due north to the Sierra Nevada de Santa Marta; the central chain breaks off about 8° N. lat., while the eastern fork runs north-eastward into Venezuela. The highest part of the Eastern Cordillera of Colombia is the Sierra Nevada de Cocui, the summit of which exceeds 16,000 feet in height.

The great plains or llanos in the east of Colombia are covered by savannas in the north, the territories of Casanare and San Martin, while in the south in the territory of Caquetá, there are huge primeval forests or selvas. The soil is generally river alluvium, which conceals the Tertiary strata. The great rivers in the north, including the Meta and Guaviare, flow to the Orinoco, and further south to the Amazon, whose tributaries include the upper Rio Negro, the Caquetá or Yapurá, Putumayo or Içá, and, in the extreme south, the Napo.

Climate.—The climate corresponds generally to the purely tropical position of the country, but on account of the great elevations in the west, it presents many varieties. Four typical gradations of climate can be recognised in a vertical direction before coming to the region of perpetual snow on the summits of the two highest mountains. These are (1) the *Tierra Caliente*, or hot region, in the low ground of the north-west, the large river valleys, and the great plains of the east; this zone reaches to about 3,000 feet above sea-level, a mean annual temperature of from 83° to 75° F. prevails, and the products of the soil are purely tropical. (2) The *Tierra Templada*, or tempe-

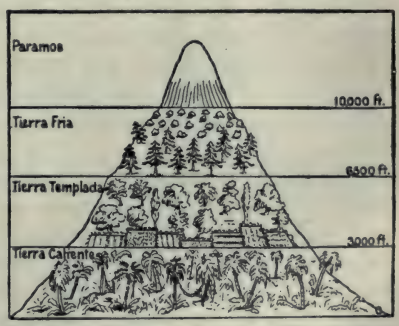

FIG. 394.—*Diagram of Andean Climate Zones.*

ate region, on the lower elevations, the foot-hills, and many of the upper river-valleys extends from about 3,000 to 6,500 feet; the mean temperature is from 75° to 65° F., and maize and coffee predominate as products. (3) The *Tierra Fria*, or cold region, on the high plains and in many mountain districts of the Cordillera, extends from 6,500 to 10,000 feet, with mean temperatures from 65° to 54° F. (Bogotá for example, at an elevation of about 8,200 feet, has a mean temperature of 58° F.). Wheat, vegetables and northern fruits are cultivated in this zone. (4) The *Paramos*, the bleak, stormy, and almost uninhabited region of the mountains from 10,000 to over 13,000 feet, principally in the Eastern Cordillera, have a mean temperature from 54° to 43° F. Trees are often found near the lower limits of this zone, but the typical Paramos begin above the tree line.

The rainfall in the north and east, as far as the Guaviare, occurs mainly in two rainy seasons (April to June and September to December) separated by two dry seasons, in the north tropical rainfall district; while in the remaining districts one of the dry seasons (that in July) diminishes more and more, and the final result is that the year is divided into one extended rainy season (*Invierno*), and the principal dry season (*Verano*) in the equatorial rainfall region, where the primeval forest takes the place of the savannas in the plain.

Flora and Fauna.—Corresponding with the climatic zones and the complex conditions of the surface, the flora is unusually rich and varied, it bears, generally speaking, the character of the South American floral region. In the woods of the hot, low plain there is a great abundance of leafy trees and many varieties of palms; extensive bamboo thickets (*guaduas*) fill many of the river valleys, ivory nuts (*Phytelephas*) and dividivi wood (*Caesalpinia coriacea*), royal palms (*Oreodoxa regia*) and coco-nut palms are widespread. Other varieties of palm, together with many tree ferns, are found in the mountain forests, and higher up the cinchona tree. Lastly, in the misty region from 8,500 to 10,000 feet on the Quindiu Pass, there grow the lofty wax palm (*Ceroxylon andicola*); a few epiphytes, principally varieties of orchids, parasites, and ferns live on the high forest trees. On the Paramos there are beautiful flowering shrubs, innumerable "frailejons" (*Espeletia* and *Culcitium*) and certain grasses and similar plants which show many interesting adaptations to the rough mountain climate.

The fauna is typically South American with a number of Central American forms in the mountains. It includes amongst the mammalia, monkeys, the ounce and puma, tapir, capybary, the manatee in the Magdalena and Atrato rivers, the ant-eater, armadillo and opossum. The country is particularly rich in birds, amongst which humming birds, parrots and the toucan may be mentioned. Caymans, tortoises, very numerous lizards and snakes, toads of great size, particularly in the hot region, and many fish are found in the Atrato and Magdalena. Large spiders, scorpions, and centipedes are common, and the insect life is extraordinarily

rich in large and beautiful butterflies, innumerable ants, locusts, and grasshoppers, and such plagues of humanity as zancudos, mosquitos, fleas and bugs.

People and History.—Before the Spanish conquest, which took place between 1536 and 1560, Colombia was inhabited by numerous Indian tribes, of whom the Chibchas inhabiting the eastern high plains, were akin to the Quichuas of Peru. Besides the written sources of information, the numerous discoveries in the Central and Western Cordillera of graves containing gold, stone and clay utensils, are of special importance. The civilised Indians of the Eastern Cordillera, still form an important constituent of the population in the east and south of Colombia. *Indios bravos*, that is uncivilised tribes, are now found principally in the eastern plains, the northern mountains, particularly in Santandér and in the Sierra Nevada de Santa Marta (*Arhuacos*), in the Guajira peninsula (*Guajiros*), in the primeval forests of the Cordilleras of Chocó, and to some extent in western Antioquia. In the extreme south the Indians closely approach to the Quichua type. The bulk of the present inhabitants are the descendants of the invading Spaniards, who mixed with the Indians as well as with the negroes introduced as slaves from Africa. A great part of the original Indian population was killed out by persecution. The negroes and mulattoes form a large fraction of the population of the hot region. The predominant language everywhere is Spanish, and the religion Roman Catholic ; with an archbishop in Bogotá and nine bishops.

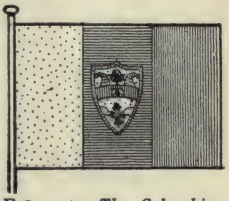

FIG. 395.—*The Colombian Flag.*

The Spaniards founded in 1547 the Captain-Generalship of New Granada, which became a Vice-royalty in 1718. Independence from Spain was secured between 1810 and 1819, when Bolivar united New Granada with Venezuela, and in 1822 Ecuador was added to the union. This large republic of Colombia lasted only a few years ; in 1829 Venezuela separated, and in 1830 Ecuador followed its example. The constitution of the country has frequently changed since 1831, when it was known as the Republic of New Grenada ; in 1857 its eight States formed the Grenadine Confederation ; in 1861 it was the United States of Colombia with nine States. In 1886 the present republic, with its capital at Bogotá, was formed, and in 1903 the province of Panama broke off under the guarantee of the United States. These provinces are Cundinamarca containing the capital, Boyacá, Santandér, Magdalena in the north-east, Bolivar in the north, Tolima and Antioquia in the centre, Cauca on the west, and Panama; the formerly independent territories of the thinly-peopled eastern plain are divided between Cauca and Cundinamarca. Each province has its own financial administration. The central government consists of a President, seven responsible Ministers, a Senate of twenty-seven members, each department being represented by three, and the

Chamber of Deputies, who number 68, one being elected for every 50,000 inhabitants.

Productions, Commerce and Towns.—As a rule the soil is cultivated only for the domestic supply, but recently the coffee plantations of Santandér and Antioquia have acquired some importance for export. The principal plants grown in the hot region are sugar-cane, bananas and cacao; maize, coffee and yucca in the temperate; and wheat, vegetables and fruit in the cool region. Tobacco is an important crop near Ambalema in Cundinamarca, and great herds of cattle are kept on the llanos, in the Cauca district, and elsewhere. There is a certain amount of mining, including gold, particularly in Antioquia, silver, copper, iron, salt and coal, while emeralds of great value are found near Muzo in Santandér. Industry is as yet little developed and practically is confined to articles for home use; most necessaries of life have to be imported, including even flour. Trade is much hindered on account of the bad means of communication. There are only about 250 miles of railway, and almost no roads, only mule tracks and footpaths with far too few good bridges. Education is in a neglected condition; the province of Antioquia is the best supplied with schools. Progress has been greatly retarded by the frequency of civil wars and changes of government.

The population is principally concentrated on the mountains and high plains of the Eastern and Central Cordilleras, and the upper Cauca basin; and also, of course, in the seaports. The only large town is the loftily situated *Bogotá*. The principal harbours are on the north coast; on the thinly-peopled west coast *Panama* and *Buenaventura* were alone of importance. The fine and strongly fortified harbour of *Cartagena* formerly carried on a great trade with the interior, but now the "Queen of the Indies" is thrown into the shade by *Barranquilla* on the Magdalena, and its sea-harbour, Sabanilla, now called *Puerto Colombia*. In 1890 two-thirds of the imports passed through Barranquilla, and the Magdalena remains the principal artery of trade, although its navigability leaves much to be desired, and vessels ascend only as far as the neighbourhood of *Honda*. The well-peopled western portion of Colombia is also reached by the Cauca, the largest tributary of the Magdalena, and by the Atrato which flows into the Gulf of Urabá (Darien), and is navigable throughout almost its whole length to *Lloró*. The statistics of Colombia are very unsatisfactory.

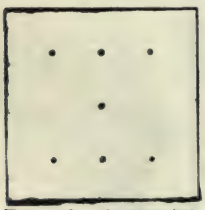

FIG. 396.—*Average population of a square mile of Colombia.*

In **Panama** the railway from *Colon* to *Panama*, about 45 miles long, is important for transit trade from one ocean to another. A great canal designed to allow vessels to cross the isthmus was commenced in 1881 by a French company, but abandoned after immense financial loss. The work has now been undertaken by the United States Government with every prospect of success.

STATISTICS.

Province.	Area in sq. miles.	Population.	Density of Population per sq. mile.
Antioquia	22,790	465,000	20
Bolivar	27,040	945,250	9
Boyacá	33,320	517,000	16
Cauca (including Caquetá Ter.)	257,480	460,000	2
Cundinamarca (including San Martin Ter.)	79,700	537,500	7
Magdalena	26,950	137,500	5
Santander	16,290	432,000	27
Tolima	18,440	305,250	17
Colombia	482,010	3,099,500	6·5

Population of Bogota	120,000
" Medellin	40,000
" Barranquilla	40,000

ANNUAL TRADE (*in pounds sterling*) 1891–95.

Imports	2,500,000
Exports	3,400,000

REPUBLIC OF PANAMA.

Area, 31,570 sq. miles. Population, 340,000. Density of population, 11 per sq. mile.

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II.—ECUADOR

[By Sir Clements R. Markham, K.C.B., F.R.S.

Position.—The three republics of Ecuador, Peru and Bolivia, on the western side of South America, occupy the territory which once comprised the empire of the Incas. The great chain of the Andes forms their backbone, and includes the principal part of all three countries. All three contain vast forest-covered territory to the east of the Andes, and the two first also include a coast region between the mountains and the Pacific Ocean. The general configuration is the same, and they may be considered as one division of the continent, each divided into three very distinct regions, the Andes, the Coast, and the Montaña or eastern forests. Ecuador, as the name implies, is crossed by the equator, and it includes the equatorial group of the Galapagos Islands in the Pacific.

The Andes of Ecuador.—The Andes form two chains of mountains, the eastern being composed of gneiss and schists, with some granite in the south; and the western of porphyritic rocks, diorite and greenstone. The ranges are connected by mountain knots which divide the plateau between them into ten basins, much broken by spurs and ravines, but sometimes containing plains of considerable extent. Their drainage generally finds its way to the Pacific, but in four places rivers force their way through the

main eastern chain and join the Amazon. The great volcanic eruptions, which form so prominent a feature of the Andes, have thrown up magnificent peaks, and so overlaid the original formations by volcanic rocks that the earlier ranges are almost obliterated, except in the south. The loftiest peak of Chimborazo, 20,498 feet above the sea, overlooks the coast region; but, with this exception, the grandest snowy masses are on the eastern chain, including Cotopaxi (19,613 feet), Antisana (19,335 feet), and Cayambe (19,186 feet). The volcanoes of Cotopaxi, Tungaragua (16,690 feet) and Sangai (17,464) are still active, and are by far the loftiest active volcanoes in the world; while Pichincha, overhanging the city of Quito (15,918 feet), has only been dormant since 1660. The average height of the Andes of Ecuador is 11,400 feet, and that of the habitable basins between the ridges about 8,000 feet.

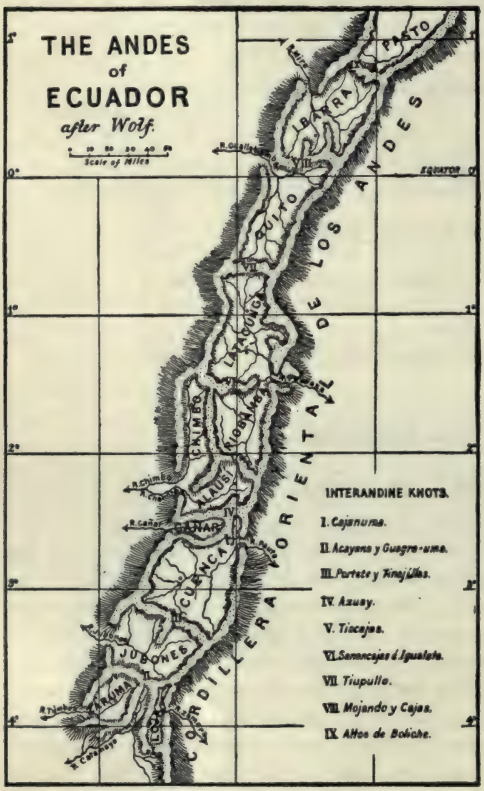

FIG. 397.—*The Andean Basins of Ecuador.*

The Andean Basin.—From the most northern basin, that of Ibarra, streams flow westward to form the Mira, the bounding river, in the coast region, between Colombia and Ecuador. The lake of San Pablo, nine miles long in this basin, is the only large lake in the Andes of Ecuador. The next basin to the south, that of Quito, is watered by streams forming the river Guallabamba, a tributary of the Esmeraldas, which traverses the coast region and falls into the Pacific. The two basins of Latacunga and Riobamba are watered by streams uniting to form the Pastaza, which crosses the eastern chain through a narrow ravine, and, forming a sublime cataract, dashes down a profound gorge into the Amazonian plain. Here there is some of the grandest scenery in the world. The rivers Caute and Zamora, draining the basins of Cuenca and Loxa, also find their way through the

eastern chain. A spur from the Western Cordillera runs parallel with the main range for 60 miles, commencing to the north of Chimborazo, and forms a valley down which the river Chimbo flows southward, and unites with the Chanchan coming from the Alausi basin, and both unite to join the Guayas. The Cañar (Naranjal) and Jubones basins send rivers of the same names to the Gulf of Guayaquil, and the most southern Zaruma basin is drained by the river Tumbez, which separates Peru from Ecuador on the coast. Other rivers flow from the outer slopes of the Andes, such as the Ventanas and Doule to the Pacific coast, and the great river Napo on the eastern slope of Cotopaxi.

The Coast Belt.—The Pacific Coast of Ecuador, which extends from 1½° N. at the mouth of the Mira, to 3½° S. near the mouth of the Tumbez, presents two entirely different aspects. From the Mira river to a short distance south of the equator it is clothed with dense tropical vegetation, and some of the reaches of the river Esmeraldas present scenes of surpassing beauty. To the south vegetation is stunted and the coast becomes barren. In the interior of the coast region, which is about 80 miles wide, up to the foot of the Andes, there are long spurs, and an isolated chain of hills of Cretaceous formation. The great feature of the coast is the gulf of Guayaquil at the extreme south, with its large island of Puna. The river system of Guayas converges to form a large estuary on its north side, and the vegetation again becomes rich. Along the shore of the Canal de Jambali, on the east side of the gulf, there is a very fertile district famous for its cacao plantations, but the desert again commences on the south side.

The Amazonian Slope.—The spurs from the Eastern Andes gradually subside into the vast forest-covered Amazonian plain which, within the limits of Ecuador, is traversed by the rivers Napo, Pastaza, Santiago and Tigre. The boundary with Peru in this direction is unsettled. Ecuador claims as far as the mouths of the rivers in the Amazon (Marañon), while the Peruvians maintain that the courses of the rivers as far as they are navigable belong to them.

Climate and Vegetation.—The temperature on the low ground is very high, the annual average at Guayaquil being 82° F. On the Andean basins the great height moderates the heat, the mean annual temperature at Quito (over 9,000 feet) being 55½° F. (Fig. 392). There and on the western slope a hot, wet season lasts from December to May, with March as the wettest month. The eastern slopes are subject to the heavy rainfall brought across the Amazonian plain by the trade winds.

The northern part of the coast region is covered with magnificent forests, and here the Castilloa kind of india-rubber is found. On the banks of the Guayas system of rivers vegetation is also rich ; while on the western slopes of the mountains there are great varieties of flowering shrubs. This, too, is the home of the Red Bark tree, the richest in alkaloids of all the Cinchonæ. The eastern forests abound in graceful palms of

many kinds, enormous forest trees, many of them yielding valuable woods; and in the forests of Loja are the famous trees of Cinchona officinalis (or Condaminea), the first species that was used for the cure of fever. In the basins of the Andes, from their great elevation, the vegetation is scanty, chiefly consisting of Compositæ, and on sandy tracts the cactus and the agave grow.

People and History.—The natives of the Andes of Ecuador are of a race closely allied to the Inca Indians of Peru, copper coloured, with long straight hair, no beards, black eyes, and wide faces with large mouths. They are broad shouldered, with great powers of endurance as travellers, and strong as carriers. Owing to long ages of oppression they are melancholy, phlegmatic and taciturn. In the eastern forests there are numerous wandering tribes of a different race. Chief among them, in numbers and importance, are the Jeveros, a warlike, brave and astute people who can tolerate no yoke; they are cultivators as well as hunters, and range between the rivers Pastaza and Santiago. The Zaparos, in the basin of the Napo, are less warlike and of different race, their physiogonomy being Mongolian; separate branches of the tribe are composed of fishermen, hunters and cultivators. Apart from the aboriginal Indians the population consists of creoles of more or less pure Spanish descent, negroes, mulattoes, and mixed races who speak Spanish; but at least two-thirds of the inhabitants of Ecuador are Indians, speaking the Quichua language. Almost all the inhabitants are of Roman Catholic faith, and education is much neglected. Originally an independent people under their own "Scyris" or kings, they had their capital at Quito. These Indians were conquered in about 1450 A.D. by the Incas, who introduced large colonies from Peru and enforced the use of the Quichua language. In 1534 the Spaniards arrived in the country, and from 1564 Quito was governed by a President of the Court of Justice, under the Viceroy of Peru. In 1729 the Presidency of Quito was placed under the newly created Viceroyalty of New Granada, and so it continued until independence of Spain was secured by the victory of Pichincha on May 22, 1822. For eight years it was part of the great Republic of Colombia, but in 1830 it commenced a separate existence under the name of the Republic of Ecuador, with its capital at Quito.

FIG. 398.—*The Flag of Ecuador.*

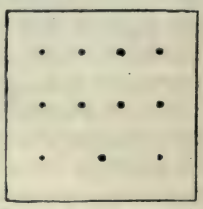

FIG. 399.—*Average population of a square mile of Ecuador.*

Productions.—There are no manufactures of any consequence, Panama hats being the chief manufactured export. Wheat and barley are grown in the Andean basins, but only sufficient for home consumption, cereals being imported from abroad for the use of Guayaquil and the

coast. Cattle are raised in some districts, and maize is largely used. There are large cacao estates on the east side of the bay of Guayaquil and on the banks of some of the tributaries of the Guayas, and some coffee is also raised. The chief article of export is cacao, then follow Cinchona bark, sarsaparilla, Panama hats, india-rubber, coffee, hides and sugar. There are some gold workings in the basin of Zaruma, and there were formerly gold washings in the eastern streams, but minerals scarcely figure in the customs returns. There is steam and boat communication on the Guayas and its tributaries, and a railroad from Duran, opposite to Guayaquil, passes Chimbo, and is being extended towards Quito. The roads in the interior are merely tracks formed by the traffic.

Divisions and Towns.—The republic of Ecuador is divided into eleven provinces in the Andes, corresponding with the basins already enumerated, and four on the coast. North of Quito are the two provinces of Carchi and Imbabura, with capitals called *Tulcan* and *Ibarra*, both small towns. *Quito* is in the province of Pichincha, at an elevation of over 9,000 feet, and possesses the usual public buildings of a national capital. South of Pichincha come the provinces of Leon with the town of *Latacunga*, Tungaragua with the town of *Ambato*, and Chimborazo with *Riobamba*. South of Chimborazo is the province of Bolivar, with *Guaranda* as its capital; and the province of Cañar, containing very interesting Inca ruins, has two towns, *Azoques* and *Cañar*. The three most southern provinces are Azuay, with the large and charmingly situated town of *Cuenca;* Loja, with the town of the same name; and Oro, where gold mining has been commenced round the little town of *Zaruma*. Each of the Andean towns occupies the central position in a lofty but habitable basin surrounded by mountains. The four coast provinces are Los Rios, with the *Bodegas de Babahoyo* as capital; Guayas, with the great port of *Guayaquil;* Manabi, and Esmeraldas. Finally the Oriental province comprises the vast forest-covered region to the eastward of the Andes.

The great geographical interest attaching to Ecuador, the classic ground of Condamine and Humboldt, lies in the magnificent series of lofty active and extinct volcanoes. To the antiquary it is a region very interesting from the remains of a past indigenous civilisation. Rich in all the varied products of the temperate and tropical zones, it is a country of magnificent future possibilities, but needing population for its development.

STATISTICS (*Estimates*).

Area of Ecuador (square miles)	120,000
Population of Ecuador	1,300,000
„ Guayaquil	50,000
„ Quito	40,000
„ Cuenca	25,000
„ Riobamba	12,000
Value of Exports in pounds sterling	1,400,000
„ Imports „ „	1,200,000

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III.—PERU

By Sir Clements R. Markham, K.C.B., F.R.S.

Coast Region.—Peru, like Ecuador, is divided into three well-marked regions, the Coast, the Sierra, or region of the Andes, and the Montaña, or tropical forest within the basin of the Amazon. The strip of land between the Pacific and the Andes, averaging 20 miles in width, consists of a desert traversed at intervals by rivers. Its coast extends from 3½° to 18° S., and trends south-south-east and south-east from 81° W. at Point Parima to 70° W. The absence of rain on the coast of Peru is caused by the action of the lofty wall of the Andes on the trades, wringing from those winds the last particle of moisture that a very low temperature can extract. Dry winds consequently descend the western mountain slopes to the coast. The constantly prevailing wind on the coast is from the south, and a cold ocean current flows from the same direction. From November to April there is usually dryness on the coast, with a clear sky, but from June to September the sky is obscured for weeks together by mist, which is often accompanied by drizzling rain. The wind never exceeds a gentle breeze all through the year. When it is hottest and driest on the coast, it is raining heavily in the Andes, and the rivers are full. When the rivers are at their lowest, the mists and drizzling rain prevail on the coast.

The surface of the deserts between the rivers is generally hard, but there are often accumulations of drifting sand in the form of half-moon shaped dunes called *medanos*, convex towards the trade winds. When the mists set in the low barren hills, near the coast, called *lomas*, are covered with a blooming vegetation of wild flowers. In hollows which are reached by moisture, the desert supports a few trees, such as the algaroba (*Prosopis horrida*). A striking contrast to the desert is afforded by the banks of the rivers, rich with groups of palms, fine old willow trees, fruit gardens, and wide expanses of sugar-cane, cotton, or vineyards.

The Andean Region.—The Peruvian Andes increase in height from north to south. The mountain system consists of three ranges. The Maritime and Central Cordilleras, running parallel and near each other on the western side, are of identical origin, and on them are the volcanoes and many thermal springs. But the great Eastern Cordillera, properly called the Andes, is distinct. The narrow space between the maritime and central chain is for the most part a cold and lofty tract known as the Puna. The Sierra is the much wider region between the central and eastern chains, consisting of lofty spurs, wide plains, valleys and deep ravines. The Eastern Cordillera is a magnificent continuous range, in great part of Silurian formation, with talcose and clay slates, and intrusions of granitic rocks. It is cut through by six rivers in Peru, namely the Marañon,

Huallaga, Mantaro, Apurimac, Vilcamayu and Paurcartambo, the four last being tributaries of the Ucayali, a main affluent of the Amazon. The Central Cordillera is not cut through by any river, although several sources of coast streams are to the eastward of the line of highest peaks. It, however, forms an unbroken water parting. It consists of crystalline and volcanic rocks, with Jurassic strata, often thrown up almost vertically, on its flanks. The Maritime Cordillera is of the same formation, the two lines being merely separated by erosion. The habitable tracts within the Cordilleras are from 5,000 to 12,500 feet above the sea ; and the average height of the Puna and lofty ridges is from 12,500 to 14,500 feet ; the peaks rising to from 16,000 to 19,000 feet.

Rivers of the Andes.—At the frontier of Ecuador the Maritime Cordillera is of moderate height, but rises further south, and for 350 miles it forms the western side of the basin of the Marañon, which rises in the lake of Lauricocha, on the inner slope of the Central Cordillera. The river forces its way through the eastern chain at the famous rapids called the Pongo de Manseriche. The Huallaga, following a parallel course between the Central and Eastern Cordilleras, forces its way out at the Salta de Aguirre, and joins the Marañon. In this northern section of the Peruvian Andes the central chain attains a height of 20,000 feet. Here the river Santa rises in the alpine lake of Conococha at 10,000 feet, and flows northward down a gorge between the central and maritime chains for a hundred miles, then turns west, cuts through the mountains at a height of 9,000 feet, and reaches the coast. This is the remarkable Callejon de Huaylas, analogous to the valley of Chimbo in Ecuador. South of the sources of the two great rivers Marañon and Huallaga, the mountain knot of Cerro de Pasco, in 10° 48′ S., unites the three cordilleras which to the south become loftier and more closely defined. From the knot of Cerro de Pasco to the knot of Vilcañota in 14° S. the Andean region is drained by the tributaries of the Ucayali. The rivers sometimes cut profound gorges, but generally they form fertile valleys, with grassy mountain slopes. The source of the Apurimac, an affluent of the Ucayali, is the most distant from the mouth of the Amazon, but the Marañon has the greatest volume, and the lake of Lauricocha, where it rises, must, therefore, be acknowledged as the true source of the mightiest river in the world.

Beyond the knot of Vilcañota is the basin of Lake Titicaca, which extends into Bolivia, and has a total area of 16,000 square miles. This basin is so lofty that the vegetation is scanty, the lake itself being 12,545 feet above the sea. The northern part is drained to the lake by a number of rivers flowing over grassy plains, separated by low ranges.

The Amazonian Region.—The tropical forests of Peru, within the Amazonian basin, are traversed by the great navigable rivers flowing from the Andes, the Marañon, Huallaga, Ucayali, Yavari, and Madre de Dios. The region is naturally divided into two sections, the subtropical forests

in the ravines and on the slopes of the Andes, and the denser tropical vegetation in the plains.

People and History.—The races of Peru are very distinct in the three main divisions. The Inca Indians occupying the Andean regions, and speaking the Quichua language, in 1876 made up 57 per cent. of the whole population, and the half-castes 23 per cent. On the coast there was once a race with a peculiar language and civilisation, but it is nearly extinct, and the population now consists of negroes and Chinese. The creoles of Spanish descent are chiefly in the cities of the coast, but they are also established in the towns of the interior, and they all use the Spanish language. The wild Indian tribes in the eastern forests are calculated as including 350,000 people. The empire of the Incas, with its capital at Cuzco, was founded early in the eleventh century, and had flourished for more than four centuries, gradually extending its conquests and absorbing the numerous tribes, when Pizarro arrived on the coast. After the conquest Peru formed the centre of a large Spanish viceroyalty, with its capital at Lima near the coast. A great but vain effort was made in 1780–82 by the Inca Indians to throw off the Spanish yoke. The independence of Peru was proclaimed at Lima on July 28, 1821, and was secured by the complete defeat of the Spanish Viceroy at Ayacucho in 1824. The form of government in Peru has since been republican, the executive consisting of a President, two Vice-Presidents, and Ministers, with prefects appointed by the president in each department, and sub-prefects in each province. The legislative power is lodged in a Congress of two chambers.

FIG. 400.—*Average population of a square mile of Peru.*

Resources and Trade.—Peru is richly endowed with natural resources of all kinds, but the great need is population to utilise them. On the coast the guano of the Chincha Islands was a source of wealth for nearly thirty years, but it was exhausted in 1872, and much smaller quantities are now obtained from the Guañape, Macabi, Malabrigo, and Lobos Islands further north. In 1860 the idea of refining the extensive supplies of petroleum found in the desert between the rivers Tumbez and Chira was conceived. The fertile coast valleys produce cotton, sugar, tobacco, rice, wine and spirits from the vineyards of Yca and Pisco, Moquegua and Locumba. The cultivable area on the coast will some day be quadrupled by the extension of irrigation works. In the Andes there are numerous mines of silver, copper, gold and coal, the chief centres of the silver-mining industry being at Cerro Pasco and Puno; the total output of silver is nearly half a million pounds sterling; and of copper little

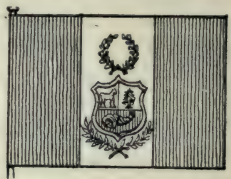

FIG. 401.—*The Peruvian Flag.*

less. The yield of wool from the flocks of alpacas, and from the wild vicuñas is a source of wealth peculiar to Peru. The vegetable products of the Andes include the finest maize in the world, the potato and several other edible roots, and there are vast areas admirably adapted for raising wheat and barley, and rearing cattle. In the ravines, on the eastern slopes of the Andes, cacao, coffee, tobacco, and coca, another valuable product peculiar to Peru, all of excellent quality, are produced. Among the wild products are the cinchona bark and india-rubber. The chief exports of Peru are sugar, silver, cotton, wool, rubber and coca leaves. Most of the trade is with the United Kingdom, Germany coming second.

Railways.—In 1902 the length of the railways in Peru was 1,035 miles. Those on the coast, twelve in number, are intended to bring the produce of the various fertile tracts on the river banks to the ports. The work on the marvellous railroad over the Maritime and Central Cordilleras from Lima to Cerro Pasco was commenced in 1870, and is not yet completed. It threads the intricate gorges of the Cordilleras by a winding giddy pathway along the edge of precipices, and spans chasms by bridges hundreds of feet high, and it tunnels the Andes at an altitude of 15,645 feet. Another line crosses the Cordilleras from Mollendo, by Arequipa to Puno on the shores of Lake Titicaca, the summit being crossed in a cutting 14,660 feet above the sea. The line is 232 miles long, and is to be continued to Cuzco. Steamers keep up the communication between Peru and Bolivia on Lake Titicaca; and the Amazonian rivers, within Peruvian territory, are navigable by steamers for 740 miles.

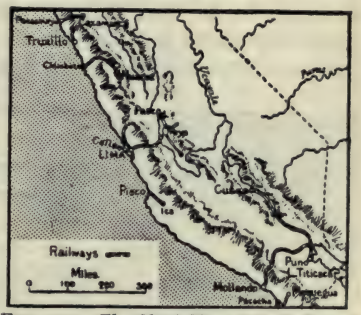

FIG. 402.—*The Chief Mountain Railways of Peru.*

Coast Departments and Towns.—Peru is divided into eighteen departments, of which eight are on the coast, eight in the high interior and two entirely on the navigable eastern rivers. Piura, the most northern department on the coast, has as its capital *San Miguel de Piura*, founded by Pizarro. It is in a fertile valley, and a railway runs to its seaport, *Payta*. Next, along the coast, comes the new department of Lambayeque, also with a railway to the port of *Eten*. Libertad contains the old city of *Truxillo*, founded by Pizarro in 1535, and now the most important place north of Lima. It had an excellent road to its port of *Huanchaco*, and now has a railway to the port of *Salaverry*. Ancachs is partly in the mountains, and partly on the coast. It includes the Callejon de Huaylas. *Huaraz*, the capital, is 172 miles from the port of *Chimbote*, with which it is connected by railway.

The department of Lima contains *Lima*, the capital of Peru. The city

was founded by Pizarro in 1535, and called "the City of the Kings, in memory of the epiphany, and also of the two sovereigns, Juana and her son Charles V. The name of Lima is a corruption of "Rimac," an oracle in Quichua, and the name of the river on which Lima is built. The houses and churches are of adobes or sun-dried bricks, and great pains were bestowed on the decoration of the façades of the churches and on some houses. Lima has railways to the port of *Callao*, to the bathing resorts of *Chorillos* and *Magdalena*, to *Chancay* in the north, and to the interior. Callao is provided with fine piers and a mercantile dockyard. *Yça*, the coast department to the south of Lima, has the capital of the same name connected with the seaport of *Pisco* by a railway; it is a pleasant town surrounded by cotton and vine estates. In this department excellent wine is made, and great quantities of a spirit called Pisco which is universally drunk in Peru. The great department of Arequipa in the south has as capital, *Arequipa*, founded, like so many other towns, by Pizarro, in 1536. It is separated from the sea by a desert of 60 miles, and stands 7,260 feet

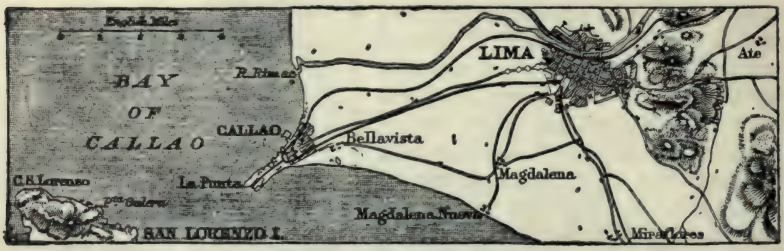

FIG. 403.—*Lima and Callao.*

above the sea-level, with a temperate climate. The magnificent cone of the volcano of Misti, 20,000 feet high, rises immediately behind the town, which is built of white volcanic stone, constructed solidly with vaulted ceilings, to resist the shocks of earthquakes. Arequipa is in the midst of a fertile plain, which is covered with fields of corn and lucerne, diversified by fruit gardens, and dotted with villages. Part of the most southerly coast department of Moquegua is still occupied by the Chileans.

Cordilleran Departments and Towns.—Within the Cordilleras the most northern department, bordering on Ecuador, is that of Caxamarca. The capital of the same name is historically interesting from having been the scene of the capture and death of the Inca Atahualpa, at the hands of Pizarro and his conquistadores. Huanuco borders on Caxamarca to the south, much of its area being covered with forest round the head waters of the Huallaga. Its capital of the same name is a pretty town. The department of Junin contains *Cerro de Pasco*, 13,200 feet above the sea, the centre of the great silver-mining industry. *Jauja* is a picturesque town, with an almost perfect climate,

and *Tarma* is beautifully situated in an amphitheatre of mountains clothed with waving fields of barley, on the high road to the most promising and best settled of the forest districts, that of Chanchamayu. The department of Huancavelica occupies the loftiest parts of the Western Cordilleras, and its towns of *Huancavelica* and *Castro-vireyna* owe their existence to the rich silver mines and the quicksilver mine of viceregal times. Ayacucho, named after the battle which secured independence for Peru, has as its capital the ancient city of *Guamanga*, founded by Pizarro in 1539, and re-named *Ayacucho* since 1824. It is a fine town with stone houses, roofed with red tiles, and is beautifully situated, 5,850 feet above the sea, surrounded on all sides but the west, which commands a glorious view, by mountains on the steep slopes of which are fields of maize, fruit gardens, and thickets of prickly pears. The department of Apurimac contains the lovely and fertile valleys of Andahuaylas and Abancay, each with its picturesque town surrounded by scenery of surpassing beauty. Cuzco is the central department of Peru. The city of *Cuzco*, capital of the Empire of the Incas, in 13½° S., is situated on a tableland surrounded by mountains, 11,380 feet above the level of the sea, at the foot of the famous hill of Sacsahuaman, which is crowned by the Inca citadel consisting of three lines of massive walls, built of cyclopean masonry, one of the stones being 27 feet high by 14 feet. The houses of Cuzco are of stone. The lower stories are, to a great extent, of Inca masonry; the upper stories, roofed with red tiles, being of later date. The fine cathedral and church of the Jesuits are built upon Inca palaces, and the church and cloisters of San Domingo consist of masonry of the Temple of the Sun. This city is only a few miles from the warm and delightful vale of Vilcamayu, one of the most charming spots in this favoured land. The most southern department, partly in the basin of Lake Titicaca, is that of Puno, which includes the ravines and forests of Caravaya. *Puno*, the capital, on the shores of Lake Titicaca, owes its existence to the rich veins of silver ore in the surrounding hills. It is now the terminus of the railway from Arequipa and Mollendo, and the junction of the Juliaca line with extension towards Cuzco (Fig. 402).

Parts of the forests of the Eastern Andes are included in the departments of Puno, Cuzco, Ayacucho, Junin and Huanuco; but there are two departments wholly within the Amazonian basin. Amazonas, with its capital at *Chachapoyas*, and Loreto, with a centre of river stream navigation at *Iquitos*, below the mouth of the Ucayali, on the Marañon. Thence steamers can ascend the Ucayali and Pachitea to *Puerto Prado*, in 9° 56′ N. and 75° 45′ W., the nearest navigable point on the Amazon to Lima.

Peru is one of the most favoured countries in the world, except as regards the one essential of population. Embracing every climate and an infinite diversity of soils and aspects, she is, or might be, the producer of every product, and all of unequalled excellence. Whatever Peru produces is the best of its kind, while the world owes to the Incas the potato, quinine, coca, and the silky fleeces of the alpaca and vicuña.

STATISTICS (*at last census*, 1876).

Area of Peru (square miles)	463,747		
Population	2,621,844		
Density of population per square mile	5·6		
Population of Lima	100,000	..	(103,000 in 1891
„ Callao	15,000	..	(35,000 in 1880
„ Arequipa	35,000		
„ Cuzco	22,000		

ANNUAL TRADE (*in pounds sterling—Estimates*).

Exports	2,000,000
Imports	1,500,000

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IV.—BOLIVIA

By Sir Clements R. Markham, K.C.B., F.R.S.

Position and Configuration.—Bolivia, formerly known as Alto Peru, occupies the southern half of the basin of Lake Titicaca, and the southern continuations of the Andes and the Maritime Cordillera. Chilean conquests deprived Bolivia of her coast province in 1883; and the country is now entirely inland. An important district extends far to the eastward of the Andes within the Amazonian basin. The boundary with Peru crosses Lake Titicaca; but to the eastward it is still in dispute.

Lake Titicaca, 12,545 feet above the sea, is 120 miles long by 40 broad, and is divided into two parts by the peninsula of Copacabana. The southern division, called the Lake of Huaqui, is 24 miles long by 21 broad, and is united to the greater lake by the narrow strait of Tiquina. The islands of Titicaca and Coati contain ancient ruins, and were held to be sacred in the time of the Incas. The volume of water received from rivers during the rainy season is lost by evaporation between April and September; and the shores of the lake are steadily receding under the combined influence of solar evaporation and the silt brought down by the rivers. The deepest part is on the Bolivian side; on the south-west there are large shoal areas covered with tall rushes. Much water is taken off from the lake by the river flowing southwards, called Desaguadero or "the drain," which has a course of more than 150 miles, and disappears in the salt lake of Paria, Aullagas, or Poopo.

The Andes on the eastern side of Lake Titicaca were formerly supposed to contain the loftiest summits of the system, but recent explorations have shown that neither of the peaks of Sorata (Ancohuma or Illampu) nor Illimani exceeds 22,000 feet. The Bolivian part of the Maritime Cordillera also contains peaks of great height, that of Sajama

being believed to be 21,028 feet and that of Tacora 19,000 feet above the sea. The plateau between the two ranges has an average altitude of 12,000 feet, with a length of 500 miles and a breadth of from 90 to 100 miles. Four rivers flow from the eastern slopes of the Andes, two to the Amazon, the Beni and Rio Grande forming the Mamore, chief feeders of the Madeira; and two to the Paraguay, the Pilcomayo and Bermejo. The Bolivian Cordilleras contain the silver mines of Potosi and Oruro which have been famous for three centuries, but the real wealth of the country lies in the ravines of the Eastern Andes and the forest-covered plains of the Beni and Mamore. It is at the head of these eastern ravines that the principal modern cities are situated.

People, History and Government.—The Indians of Bolivia belong to the Colla race, to whom the name of Aymara was erroneously given by the Jesuit missionaries in the seventeenth century. They formed part of the empire of the Incas, by whom they had been conquered. The Aymara are massive without being large; short, thick-set, broad-shouldered, with long body and short legs. The features and profile are good, the general expression sad, with a strong admixture of determination. Their chief peculiarity is that the thigh is rather shorter than the leg, and the whole build is admirably adapted for mountain climbing. The Aymara is very resolute, and he can march great distances; seventy miles in one day is not uncommon. Their language is a dialect of Quichua, containing many words of very ancient origin. Their numbers have been much reduced by disease, but there is no reliable information respecting the population of Bolivia. In the Bolivian part of the Amazonian basin the principal tribes are the Moxos on the Beni and Mamore, who are Christianised, and number about 30,000 souls, being settled in mission villages, cultivating the soil and rearing cattle. The Chiquitos form a numerous group of tribes between the head-waters of the Itenez and Mamore. They are a peaceful race of cultivators, raising cotton and sugar cane. There are also several wild hunting tribes. The people of Spanish and mixed descent form only 15 per cent. of the population.

FIG. 404. — *Probable population of a square mile of Bolivia.*

After a brave struggle the Collas (Aymaras) were conquered by the Spaniards in 1538; and in 1559 Upper Peru, or Charcas, was constituted a Presidency, with a Court of Justice under the Viceroyalty of Peru. In 1778 Charcas was transferred to the new Viceroyalty of Buenos Ayres. In 1809 the insurrection against Spain commenced, but independence was not secured until 1824, and in 1825 a general assembly of the people at Chuquisaca decreed that Upper Peru should be named Bolivia in honour of General Bolivar, the Colombian general who had come to assist in the liberation of Peru. There is a Congress of two Chambers, and there is universal suffrage for all men able to read.

Once the great industry of Upper Peru was mining, and the mines of Potosi were famous throughout the world. There are still important silver, copper and tin mines, the output being valued at over two million pounds. Wool and hides are also exported from the lofty plateaux. The rich valleys to the eastward are called Yungus, and they are the home of the Calisaya species of cinchona which yields the largest percentage of quinine; while the cacao and coffee grown in the Yungus is the best in the world. Coca is also largely grown and exported. In the Amazonian plains, within Bolivian territory, the establishments for extracting india-rubber are numerous and increasing.

Divisions and Towns.—There is a service by steamers across Lake Titicaca which connects La Paz, the chief city of Bolivia, with the railway from Puno to the coast. A railroad has recently been constructed from the Bolivian city of Oruro to the Chilean port of Antofagasta on the Pacific coast, and others have been projected.

Bolivia has been divided into departments, of which there are eight. La Paz is the most northern department. Its capital is the chief city of the republic and well situated for trade. It was founded by order of President Gasca in 1548, and the native name of Chuqui-apu was changed to *La Paz*. The famous capital of the department of *Potosi* has lamentably fallen off. Situated on the silver-bearing Cerro de Potosi, its population in Spanish times was 160,000, and now it is barely 12,000. *Oruro*, on the salt plain north of Lake Aullagas, is the capital of the department of the same name, and it also has fallen from its glory in Spanish times, yet it is still the centre of a silver and tin-mining industry, and is connected by railway with Antofagasta. The plains of Oruro yield good crops of potatoes and barley, and afford pasturage for flocks of llamas and sheep.

The department of Chuquisaca lies within the basin of the Pilcomayo, a tributary of the Paraguay. Its capital, originally named La Plata, was founded by order of Pizarro, in 1539; the native name is Chuquisaca, but the first Republican Congress ordered it to be called *Sucre*, after the first President. Though the nominal capital of the Republic, and the seat of a university, it is not nearly so important a place as La Paz. *Cochabamba*, in a province of the same name in the Amazonian basin, on a tributary of the Mamore, in the midst of a fertile and well-cultivated plain, is the most agreeable place of residence in Bolivia. Still further east is the department of Santa Cruz de la Sierra. Beni is the department which embraces the region of dense forest, and the fluvial highways of the Beni and its tributaries. The most southern department, bordering on the Argentine Republic, is that of Tarija, which lies in the basin of the Bermejo, a tributary of the Paraguay. The town of *Tarija*, surrounded by fruit gardens, enjoys a charming climate.

STATISTICS (*Estimates*).

Area of Bolivia in square miles	567,000
Population of Bolivia	2,000,000
Density of population per square mile	3·5

Population of La Paz	40,000
„ Cochabamba	25,000
„ Sucre	20,000
„ Potosi	20,000

ANNUAL TRADE (*in dollars*).

Imports	3,000,000
Exports	12,500,000

STANDARD BOOK.

M. V. Ballivian and E. Idiaquez. "Diccionaria Geográphico de la Republice de Bolivia." La Paz, 1890.

V.—CHILE [1]

By Alejandro Bertrand,

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Configuration, Geology and River Systems.—Chile is a relatively narrow strip of land stretching from 18° to 54° S. between the Cordillera of the Andes and the western coast-line of South America. The width of the country varies from 70 to 140 miles, except close to the northern and southern extremities, where it widens to 250 miles.

The general surface of the land, whilst sloping rapidly from the Cordillera to the sea, slopes also, but more gently, from north to south ; so that the central part of the strip which at the northern extremity rises to 3,000 feet above sea-level, is covered by the sea in the south, where the valleys form numerous channels or fjords, and the higher ground a swarm of islands. North of 41° S. the coast is destitute of deep bays, and owing to the abrupt rise of the land towards the interior it presents the appearance of a chain of hills when seen from the sea. Natural harbours are scarce along this coast, and nearly all are without shelter from the north. In the southern archipelago, on the contrary, they are numerous and well sheltered, but none of any size.

FIG. 405.—*Southern Chile and Magellan Strait.*

The upheaval of the Cordillera of the Andes, which separates Chile from the Argentine Republic, was the result of crustal movements occurring long after the formation of the rocks composing the range, the chief of which are porphyry, sandstones, and metamorphic rocks. The Chilean-Argentine Andes contain the highest peaks of America, one of which, Aconcagua, attains an elevation of 23,000 feet. Parallel to

[1] Translated from the Spanish.

the Andes, and nearer the coast, runs a succession of lower mountains, of much older formation, in which granite and gneiss predominate ; and between these two ranges a plain 30 miles wide and known as the Central Valley of Chile, stretches from 33° to 41° S. It is covered with drift or alluvial deposits which form a very rich soil, traversed and irrigated by the numerous rivers descending from the Andes. The hydrographic basins of these rivers are disposed with some uniformity ; as a rule, the principal valleys or canyons of the Cordillera run from north to south, and very frequently from south to north ; after the junction of the chief affluents they cross the central valley and are deflected by the coast-hills, along the eastern side of which they run until they meet with the gaps through which they throw themselves into the sea. The river Maule, which enters the sea about 35° S., is the first northerly one navigable for lighters or small craft from the central valley. The rivers Imperial, Valdivia, and Bueno, farther south, are navigable for small steamers in the lower parts of their course. From the structure of the country all the rivers are necessarily short.

Natural Resources.—The greater part of the surface of the country is occupied by lofty mountains which, in the northern districts, are treeless and almost absolutely arid. But deep in their recesses valuable lodes of copper, lead, silver and manganese ores lie concealed. In the nearly desert region of the provinces of Tarapacá and Atacama, between 19° and 26° lat., the configuration of the central valley and bordering ranges is the same as in the south ; and on the western borders of this rainless district deposits of nitrate of soda (Chile saltpetre) occur on the surface. It is one of the best nitrogenous manures, and more than 400,000,000 tons have been extracted and exported, mainly to Europe. Metallic lodes, chiefly copper and iron-pyrites, also abound throughout the country, especially in the spurs of the Andes. About 37° S. beds of lignite are to be found. Alluvial gold occurs nearly all over the country, but the placers yield a poor return. In the central region there is an abundant supply of calcareous rocks useful for the manufacture of lime and cement. Native sulphur occurs abundantly in the Cordillera, and gypsum is still more widely distributed. Fine granite and especially trachyte is quarried and makes excellent building material. Throughout the country there is clay for brick-making, and kaolin for manufacturing porcelain is also plentiful. In almost all the valleys of the Andes there are mineral springs possessing medicinal properties. Wood for fuel and coal exist in nearly every part of the country. From the 34th parallel southward indigenous trees are found in increasing quantity, but without much variety of species ; the timber they yield is firm and hard, but somewhat heavy. European trees, especially the poplar, are very easily acclimatised ; the Australian blue gum (*Eucalyptus globulus*) has also increased considerably. A large portion of what was formerly wooded land has been cleared and converted into fields and pastures.

The native fauna is not abundant in species, even in the woodlands. The only noxious carnivorous animal is the puma (*Puma felis*), which is about the size of a large dog. The imported quadrupeds and birds multiply with great facility.

Climate.—In Chile there are all climates. The temperature is in general lower than that corresponding to the same latitudes on the northern hemisphere on account of the cold Humboldt current, which flows along the coast from south to north. In the north, as far as 30° S., rain is the exception, although dense clouds are of frequent occurrence; on the other hand, from 36° S. southwards, rain falls on most days, especially in winter; the largest rainfall occurs about 41° S. The winds which prevail on the coast are chiefly from the west and south-west. The climate of the central valley and of the coast between 32° and 36° S. is one of the most pleasant in the world, the thermometer seldom rising above 77° F., or falling below 32°. This region is, at the same time, one of the healthiest to be found anywhere, because the slope of the land secures good drainage and prevents the formation of marshes.

People.—The principal of the aboriginal peoples of Chile and the only one of which genuine representatives now remain in the country, leaving the Fuegians out of account, is that commonly known as the Araucanian, a race distinguished by its endurance, its valour and its indomitable character. Of the blood running in the veins of the present population of Chile, especially of the lower classes, a large proportion is Araucanian; this ancestry entails many good qualities, but also some vices, chiefly a propensity to drink. The educated classes consist almost entirely of the descendants of the Spanish conquerors who settled in Chile in the sixteenth century; and these have preserved the language and religion of Spain, without alteration, as well as most of the habits and social customs of the mother country.

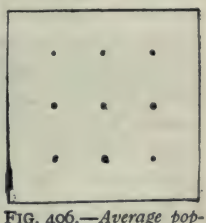

FIG. 406.—*Average population of a square mile of Chile.*

History.—The conqueror and first governor of Chile was the Spanish soldier Pedro de Valdivia, who founded the capital, Santiago, in 1541. According to the Spanish system of colonising, the companions of Valdivia, and also their successors and descendants, divided amongst themselves the natives of the conquered land, and employed them for working the mines, extracting gold and cultivating the soil. Although Spanish colonies were settled all over the Araucanian territory soon after the conquest, the dauntless natives succeeded in regaining a large part of their lands; and it can be said that, up to the middle of the nineteenth century, a stretch of territory extending for about 150 miles between the rivers Biobio and Valdivia, remained in the hands of the Araucanians. In 1810, the royal power of Spain having been

suspended in the Spanish colonies, the first national government of Chile was established. Three years later, the forces sent from Peru by Spain reconquered the country, but, in 1817, Chile succeeded in finally regaining its independence, and General O'Higgins, the head of the government, assisted by the celebrated naval volunteer, Lord Cochrane, and the Argentine general, San Martin, attacked the Spanish army of Peru. With the exception of a few revolutions of no lasting character, Chile has since been able to pursue its development peacefully, and its democratic institutions have been gradually taking root. In 1879 a war broke out between Chile and the neighbouring republics of Peru and Bolivia, which resulted in the acquisition by Chile of the territories of Antofagasta and Tarapacá.

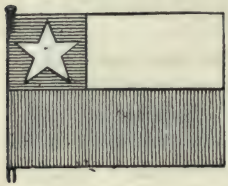

FIG. 407.—*The Chilean Flag.*

Government and Administration.—The form of government is republican. All the functionaries in the department of Administration are designated by the President. Prior to 1890, the government, or rather the president, was in reality the chief elector of Congress; but since the revolution of 1891 the country has asserted its electoral rights, and Ministers are now appointed by Congress. The wealth accruing to the Chilean treasury from the tax on nitrate of soda, since 1880, has been the means of giving a great impulse to the administration, to education, to the navy, the army, and the railways, which almost all belong to the State. The municipalities, which were formerly departmental and directly subordinate to the central government, are now communal and have complete local self-government; but they are for the most part poor, and require assistance from the national Treasury.

Industries and Commerce.—The staple industry of the country is the extraction of nitrate of soda, of which substance between one and one and a half million tons are exported annually. The annual exports of iodine extracted from the nitrate amount to about 300 tons. Next in importance comes the working of the silver, copper and gold ores, borax and coal, the export of which yields about two and a half million pounds sterling yearly.

Agriculturists are concerned mainly in the cultivation of cereals, tobacco, vegetables, vine-growing and cattle-breeding. The most advanced agricultural industries are flour-milling, wine-making, and the preparation of cheese, dried and preserved fruits and honey. Other industries, such as tanning, shoemaking, distilling and brewing are not very advanced, and are chiefly carried on by the German colony in the province of Valdivia.

Means of Communication.—There are two lines of British and German steamers with fortnightly sailings for Europe *viâ* the Strait of Magellan, and a weekly steamer service to Panama, as well as coasting steamers. The journey from Santiago to Buenos Aires through the Cordil-

lera takes three days and a half, and is closed by snow from June to October, the winter months. Santiago is connected with Valparaiso and Concepcion by a railway which extends to Valdivia, and there are various other lines. The plains are netted with roads, and there are roads, in general mere cattle tracks, in the Cordillera also.

The Chief Towns of Chile.—*Santiago* (33° 30′ S.), the capital, is situated at the foot of the spurs of the Andes, on the banks of the little river Mapocho, which flows through the town in a stone channel 130 feet wide, and on the eastern border of an extensive and fertile plain watered by canals from the river Maipo. The town rests upon a firm subsoil of great depth covered by deep layers of vegetable mould. The streets of Santiago are wide, straight and laid out at right angles. The steep slope from east to west facilitates drainage, and ensures the good sanitary conditions of the town. Its special features are the Santa-Lucia hill, a picturesque rocky eminence 230 feet high, close to the business quarter, which has been converted into a handsome promenade, and the Alameda, an avenue over a hundred yards wide and two miles long, which is the chief highway. Santiago possesses the State University, beside numerous establishments for technical and superior instruction.

Valparaiso (33° S.) is the chief port on the west coast of South America. It is the terminus of important lines of steamers for Europe *viâ* the Strait of Magellan and Panama, and the centre of the coasting services. It contains a numerous foreign colony, composed chiefly of British, German and French traders. The harbour is well sheltered on the south and south-west, but is completely open on the north; as a matter of fact, however, the wind seldom blows from that quarter. There is a Custom House wharf, alongside which steamers of ordinary tonnage can moor; but most of the loading is done by lighters from a quay surrounding the town. The whole of the harbour is defended by modern, well-mounted batteries.

FIG. 408.—*The Site of Valparaiso.*

Iquique (20° S.), built in the middle of the desert, is the most important port on the Tarapacá coast for the shipment of nitrate. This town has, among other great public works, a supply of drinkable water brought down from the Cordillera by a large canal. *Copiapó* (27° S.) is now insignificant, but it was formerly, when silver commanded a high price, a silver-mining

centre of very great importance. The Copiapó valley, though narrow, is very fertile, and is the most northerly point of Chile to which agriculture has been carried. *La Serena* (30° S.), situated close to one of the best Chilean ports, *Coquimbo*, is the chief town of a province boasting a most delightful climate, but owing its importance to its mineral wealth, and its numerous metallurgical establishments.

Concepcion (36° 20′ S.), situated at the mouth of the Biobio, the largest river in Chile, is the commercial centre of the whole southern region as far as the river Cautin, about 38° 30′ S. A railway connects it with Santiago; with old Araucania, an agricultural, wooded region of considerable importance; and with the coal-bearing coast region to the south. The port of Concepcion is at *Talcahuano*, situated in the beautiful and extensive bay of Concepcion. Talcahuano has a first-rate dry dock, built of stone, round which a large military port is being constructed. For the defence of the bay modern batteries have recently been erected. *Chillan* is the centre of a large trade in cattle, chiefly cattle and horses. *Talca* (34° 40′ S.) is an inland town, situated in the middle of the old agricultural district, the natural outlet of which, before the trunk railway was built, was the port of *Constitucion*, at the mouth of the river Maule.

Valdivia (40° S.) at the mouth of the Calle-Calle and *Puerto-Montt* in the Gulf of Reloncaví, are two important ports of the southern region; their development is due chiefly to the German colonists who settled in that part of the country about 1850. *Punta Arenas* (53° S.) is the capital and only town in the territory of Magallanes, which now contains a little over 5,000 inhabitants. The breeding of animals producing wool is the chief industry in this region, but there is a little gold-mining. In the western archipelago seal-hunting is carried on on a large scale. Punta Arenas being situated in the middle of the Strait of Magellan, is, in spite of its remoteness, a calling station for European steamers.

STATISTICS.

	1885.	1895.
Area of Chile (square miles)	293,000	293,000
Area inhabited before 1880	115,000	115,000
Population of Chile	2,527,000	2,980,000
Density of Population per square mile	9	10

POPULATION OF CHIEF TOWNS.

	1895.	1898.		1885.	1895.
Santiago	256,400	302,000	Talca	33,200	40,000
Valparaiso	122,500	140,000	Iquique	33,000	33,000
Concepcion	40,000	50,000			

ANNUAL TRADE (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	6,930,000	8,755,000	12,444,000
Exports	6,440,000	10,706,000	11,603,000

STANDARD BOOKS.

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W. A. Smith. "Temperate Chile." London, 1899.

CHAPTER XLV.—THE RIO DE LA PLATA COUNTRIES

I.—THE ARGENTINE REPUBLIC

By H. D. Hoskold, F.G.S.,
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Position and Extent.—Argentina, or the Argentine Republic, terminates the South American continent, being situated between the parallels of 22° and 55° S. From the apex at Cape Horn to the Island of Martin Garcia, in 34° S., and 58° W., it is bounded on the east by the Atlantic Ocean and the Rio de la Plata or River Plate; and further north its north-eastern and northern limits are determined by the republics of Uruguay, Brazil, Paraguay and Bolivia. The western limit, forming the boundary with Chile, runs from 23° S. to 43° S. along the high summits of the Cordillera of the Andes where it coincides with the continental watershed; from 43° S. to 52° S. it continues in some places along the mountains of the Cordillera, in others along the continental watershed close to the eastern foot of the Andes. The boundary between Bolivia and Argentina was delimited by a mixed commission in 1903. The country has been constitutionally divided into fourteen Federal Provinces, and the less developed regions have been divided into nine Territories. Six of the first-named are mining and agricultural, and others are purely agricultural provinces. From 38° S. southward, the east coast is usually low but irregular in level. It is much indented, forming various important bays such as Bahia Blanca, the Gulf of San Matias, and those of San Jorge, Deseado, San Julian, and others. The principal ports are at Buenos Aires, Bahia Blanca, and La Plata; they are of artificial construction, and sufficiently large to accommodate an immense shipping traffic. The military port of Bahia Blanca is in construction, and other ports are projected along the Argentine coast, but natural harbours are few. No special trigonometrical survey has, as yet, been attempted by the government, but the great meridianal extent of the country (more than 33° of latitude) would give especial scientific interest to an exact survey which might throw new light on the figure of the Earth.

Surface and Configuration.—The surface is naturally divided into extensive tracts of low and nearly level land, and elevated regions. The plains extend from Buenos Aires northwards to the Chaco, westward to the town of Mendoza, and southward through Patagonia; but their monotony is relieved by various small chains or groups of mountain ranges, such as those of San Luis, Cordoba, Tandil, Ventana, Pampa Central, Rio Negro, and Chubut, which divide up the plains. Minor groups of hills also occupy

small areas in the western portion of the province of Entre Rios, and Santiago del Estero. The foot-hills and slopes of the Andes form extensive groups or chains of mountains of great altitude, occupying large areas of the provinces of Tucuman, Salta, Jujuy, Catamarca, La Rioja, San Juan, and Mendoza. This system of mountain chains extends southward, especially in the western portion of the national territories of Neuquen, Rio Negro, Chubut, Santa Cruz, and also in Tierra del Fuego. In the north-eastern portion of the republic, in the territory of Misiones, extensive but lower highlands occur, a continuation of the eastern mountain system of Brazil. The highest mountains rise along the Andean Cordillera, the culminating summit of which is Aconcagua (23,080 feet). The immense rocky mass of the Andes, with its various ramifications, covers a large area both of the Argentine and Chilean republics. The Andean provinces of the Argentine Republic are very rugged and broken, leading up to the crest-line which is divided by various passes, and abounding in profound gorges.

Geology.—The Andean region has been subject to various depressions and elevations, the last occurring at the close of the Tertiary period. Denudation has removed from the Argentine Andes a great thickness of rock, leaving the gneiss and granite visible over large areas. The usual intrusive rocks are common, and patches of Jurassic, Rhætic, Triassic and Silurian exist in places. The Tertiary underlies the Pampean, and is seen along the banks of the Parana, in Entre Rios, Cordoba, Corrientes, along the Patagonian coast, Strait of Magellan, and Tierra del Fuego. Masses of basalt occur inland along the river Santa Cruz. The Tertiary is believed to meet the Pampean formation along the Rio Negro. The geology of the northern and north-eastern part of the republic is little known, no official geological map having, as yet, been made.

Rivers and Lakes.—The principal rivers are the Parana and Uruguay, uniting to form the great estuary of La Plata. Further north, the Parana takes the name of Paraguay, the chief tributaries being the Pilcomayo (the boundary of the republic towards Paraguay), and Bermejo, from the Andes, each of which receives various smaller streams. The province of Cordoba is watered by the rivers Primero, Segundo, Cuarto, and Tercero, the last named joining the Carcaraña, a tributary of the Parana. The river San Juan, flowing from the Andes, is joined by the Mendoza, Diamante and Atuel, and enters the river Colorado which flows into the Atlantic Ocean south of Bahia Blanca. The Neuquen and Limay are tributaries of the Rio Negro, running parallel to the Colorado further south, and also falling into the Atlantic. Patagonia is drained by the rivers Chubut, Santa Cruz and Gallegos. The lakes situated along the base of the Andes are numerous, and some of them very beautiful, such as Lake Nahuel-Huapi, one of the sources of the Rio Negro, and especially Lake Fontana, a source of the southern affluent of the Chubut. Other lakes of a different type occur on the lower ground, many of them, such as the large Mar Chiquita in the province of Cordoba, being without outlet.

Climate.—The Argentine Republic may be divided into four zones of varying temperature. The first includes the low plains of the north, situated between the parallels of 22° and 31½° S., and is of a tropical character; the second comprises the section of the plain from 31½° to 42° S., and is temperate; while the third, or southern part of the plain, from 42° to 55° S., is almost frigid. The fourth, or mountain zone, extending the length of the country, affords a variable climate, depending upon the seasons of the year, the difference of altitude and latitude.

During summer, great heat occasionally prevails in the open, low and elevated plains or campos, some of which are situated as plateaux inclosed by high mountain chains. Some of these campos are covered to a considerable thickness with finely pulverised pumice, deposits from volcanic ejections, which causes the heat to accumulate and become almost unbearable. The northern divisions of the plain, including Buenos Aires, Santa Fé, Entre Rios, Corrientes and Chaco, are not subject to anything like severe winters. From Buenos Aires, southward, the hot season is modified by the influence of the Atlantic Ocean and by thunderstorms. Generally the provinces are very healthy and the people take no harm from sleeping in the open, a very common practice. Smallpox, yellow fever, and cholera are not native diseases, but have been imported from Brazil and Italy. Such epidemics have not been known since 1886. Since that epoch strict sanitary measures and great vigilance have kept Buenos Aires free. These regulations and the water and drainage system of the capital have placed Buenos Aires as a healthy city in the first rank.

Flora and Fauna.—Extensive forests of algarroba trees (*Prosopis alba*), Quebracho, cedar, and many other varieties exist in the territories of Chaco, Formosa, Misiones and the provinces of Santiago del Estero, Tucuman, Jujuy and Salta. Several companies are established in the Chaco, converting the timber to commercial uses. In these forest regions there is a dense tropical undergrowth, consisting of shrubs, climbing, flowering and medicinal plants of the greatest variety. The *Yerba-mate* from Misiones has great commercial value, the leaves being collected and used in the same manner as tea. Nearly all the lower-level valleys in the interior provinces are well wooded. The open campos are generally covered with a stunted thorny scrub, almost impenetrable; but frequently mixed with algarobas. Cardone (*Cacti gigantia*) grows on the mountain slopes of La Rioja, and in some other places. The western mountains running southwards through the territories of Neuquen, Rio Negro, Chubut and Santa Cruz, are covered with dense forests, including several varieties of beeches and pine, from a considerable height down to the margin of the plains. The mountains surrounding the Strait of Magellan and Tierra del Fuego are covered with immense forests of beech. Winter-bark trees (*Drimys winteri*) are common in these regions, and various shrubs yielding edible berries. Orchids of great beauty and variety are also plentiful. The gigantic seaweed, *Alga macrocystis*, is common on the southern coasts and

Tierra del Fuego. Such fruit trees as are common to Europe are found here in great abundance, including various tropical fruits such as orange, lemon and other trees. Grapes of all kinds are cultivated extensively, and wine is made. Yet, in spite of these extensive woodlands, the central parts of the Argentine Republic are almost treeless, forming vast level expanses of grass land known as pampas, admirably adapted for cattle raising, and possessed in many parts of a fertile soil repaying cultivation.

The principal wild animals are American tiger (*jaguar*) and lion (*puma*), species of wolf, fox, mountain cat, guanaco, vicuña, and chinchilla. Two kinds of bears are reported to exist in the northern parts. Several species of deer, the tapir, ant-eater, a very small armadillo, and a great variety of monkeys also occur. The condor of the Andes is the chief bird of prey, and the falcon family is largely represented. The large American ostrich and a smaller representative of the same family in Patagonia are numerous. Parrots, paroquets, and humming birds are remarkable for their number, variety and beauty. Fish abound in the rivers and lakes. Amongst insects, probably the blood-sucking vinchuca (*Conorhinus infestans*), in the western provinces and in the Chaco, a small red insect that penetrates under the nails and skin, are the most odious.

People and History.—The ruins of ancient buildings and pottery have been discovered proving that at least one of the tribes of Indians inhabiting South America possessed a high degree of civilisation, and it is possible that this tribe represented the original inhabitants. At the conquest in the sixteenth century the Spaniards mixed to a great extent with the Indians, the consequences of which are still to be traced. The admixture of Indian blood is not so marked in the Argentine as in some of the surrounding republics, a fact due principally to the great influx of immigrants from all European nations. The country gained its independence in 1810, and was formed into a federal republic. The legislative affairs are managed by a Congress, formed of Senators and Deputies from all parts of the republic, and the President and his Ministers form the administrative power. The national and official language is Spanish, but many others are spoken in the large towns. The State religion is Roman Catholic, but all others are tolerated. The Government is based upon liberal, tolerant and equitable principles, and although the two classes of government, Federal and Provincial, at one time gave rise to internal aggressions and civil strife, this has long since ceased to be the case. Foreigners may become citizens at pleasure, but there is no legal compulsion.

FIG. 409.—*Average population of a square mile of Argentina.*

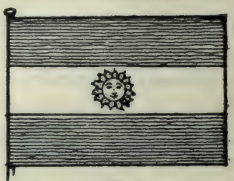

FIG. 410.—*The Argentine Flag.*

Communications and Resources.—The level surface of the eastern and central plains has led to a great development of railways, bringing the chief provincial towns into touch with the capital and chief seaport, Buenos Aires. The vast area of good unoccupied land promises great future prosperity when the resources of the country are fully utilised.

Economic minerals of nearly all kinds exist; those most abundant are copper ores mixed with gold and silver; auriferous minerals, silver, antimony, lead, tin, bismuth, iron ore, coal, salt, nitrates, borax, marbles, sulphur and petroleum also abound. In the provinces of Jujuy, La Rioja, and San Luis, and in the territories of Neuquen, Chubut, and along the Patagonian and Tierra del Fuegian coasts, there are alluvial gold deposits.

Agriculture is followed to a considerable extent; and so is stock raising, large herds of cattle and immense flocks of sheep being kept. Various establishments are engaged in the preservation of meat, and the preparation of meat-extracts, cheese and butter. The staple exports consist of live animals, wool, corn, meats, hides, timber, sugar and minerals.

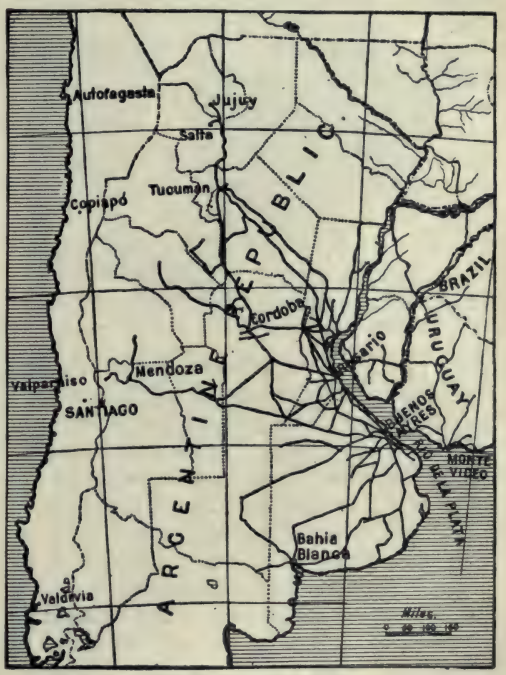

FIG. 411.—*The Railway System of Argentina.*

The Littoral Provinces.—The fourteen federal provinces of the republic may be conveniently grouped into the Littoral or Coast Provinces on the sea coast or on the great navigable rivers, the Central Provinces, the Andean Provinces in the west, and the Northern Provinces. As a rule the capital of each province bears the same name, and is the focus of the commercial as well as of the social provincial life. In addition to these provinces, and making up fully two-thirds of the area of the country, are the nine large thinly-peopled national territories, situated to the north and the south of the compact group of the provinces.

Buenos Aires is the capital of the republic, situated on the right bank of the river Plate in 34½° S. and 58½° W., and only 33 feet above sea-level. It possesses a large port sufficient for the accommodation of a great trade;

the construction of the harbour on so shallow a shore was an engineering feat of no little difficulty. It contains many elegant public buildings, and is the principal centre of the railways and commerce of the country. The affairs of the national government are carried on in this city, the cosmopolitan character of which is indicated by nearly all the languages of the world being spoken. The large and handsome squares which embellish it, are adorned with commemorative monuments to departed heroes and illustrious persons. *La Plata* is the capital of the province of Buenos Aires, one of the largest in the Federation, and is situated in 35° S. and 58° W. It is a very handsome town, with a port; its prosperity depends upon general commerce and the produce of the province, which is principally agricultural. *Rosario*, in the province of Santa Fé, on the margin of the river Parana, stands in 33° S. and 60½° W. It is an important city, and a great railway centre. Its exports are shipped direct to Europe, competing in some measure with the trade of Buenos Aires, as it is the principal river port not only for its own province but for others surrounding it. *Santa Fé*, the capital city of the province of the same name, is also situated on the Parana, but further up the river, at an altitude of 393 feet above sea-level; it also has a port. Agriculture, stock raising, and the production of fruit, corn, butter and cheese are the staple industries of the province. *Parana*, on the left bank of the Parana river, opposite Santa Fé, is the capital of the province of Entre Rios, which, as its name implies, occupies the land between the rivers Parana and Uruguay. It is generally level, but undulating, or even mountainous in parts, and is well watered. Agriculture and stock raising are carried on extensively. It exports corn, cheese, butter and live stock, and is in a very flourishing condition. *Corrientes*, on the Parana, is the capital of Corrientes, north of Entre Rios and the most easterly province of the republic. Like the other provinces of this group it is devoted to agricultural pursuits. The territory of Misiones stretches to the north-east, between Brazil and Paraguay.

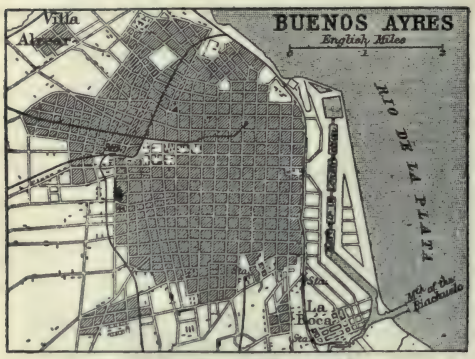

FIG. 412.—*Plan of Buenos Aires.*

Central Provinces.—*Cordoba* city is situated in a depression of an undulating plain in 31½° S. and 64° W., 1,440 feet above sea-level. It is very irregularly built, but it has a university and a cathedral, while the national astronomical observatory is situated upon a rise overlooking the city. It is supported chiefly by commerce, some agriculture, stock raising

and mining; the mines, however, are not much worked. At no great distance it is surrounded by mountains of moderate height, but the valleys between them are well watered, with woods and patches of beautiful scenery. The Northern Railway passes through the city on its way from Buenos Aires and Rosario to Tucuman and Salta. *San Luis* town, situated almost due east of Mendoza on the Western Railway, is the capital of the province of San Luis, a stretch of undulating land west of Cordoba and intermediate between the plain and mountains. It carries on mining, agriculture and stock raising. *Santiago* is the capital of the province of Santiago del Estero, north of Cordoba. The position of the town is 28° S. and 64° W., and its elevation is 530 feet above sea-level. It is mainly an agricultural province, but suffers as yet from inadequate means of transport.

Andean Provinces.—*Mendoza* city stands in a nearly level plain in 32½° S. and 69° W., 2,320 feet above the sea. Viticulture, stock raising, corn growing, and mining are the industries of the province, which borders on the Andes, and has a very small rainfall. A terrible earthquake occurred in 1861, destroying many buildings and causing great loss of life in the city. It stands on the Western Railway, which has been continued from Buenos Aires into the Cordillera of the Andes in order to connect with the Chilean lines, but is not finished. *San Juan*, the capital of a province of the same name north of Mendoza, is situated upon an almost level plain in 30½° S. and 69° W., at an altitude of 2,165 feet. Like Mendoza, the town of San Juan is sheltered on the west by the Andes. It depends upon viticulture, agriculture, stock raising, and mining. *La Rioja* is situated in 29° S. and 67° W., at an altitude of 1,670 feet. The province of which it is the capital depends chiefly upon mining, but has some viticulture, agriculture and stock raising. Its aspect is generally mountainous, with level plains between the descending spurs of the eastern Andes. It is connected by a branch line with the Northern Railway. *Catamarca* is the capital of the province north of Rioja, and stands on an undulating plain, surrounded at no great distance by mountains at the foot of the eastern Andes, in 28° S. and 66½° W., 1,722 feet above sea-level. Mining, viticulture, some stock raising, and agriculture are carried on in this province. A branch of the Northern Railway from Buenos Aires reaches the town.

Northern Provinces.—*Tucuman*, the capital of the smallest province in the Federation, is situated in 27° S. and 65° W., at an altitude of 1,520 feet. Sugar cane is largely grown in the neighbourhood, and there are various sugar manufactories, the produce of which is largely exported. Maize and other grain and tobacco are grown. Ancient mines exist in the mountains of this province, but they are not exploited. The province contains forests of timber, and tropical undergrowth, and is traversed by the Northern Railway. *Salta*, in the valley of Lerma, is situated in 24¼° S. and 65° W., at an altitude of 3,790 feet. Mining is carried on in the mountainous province of the same name, and also some agriculture. There are important forests of timber in the eastern part of the province. Coffee and

tobacco are grown. The province is bordered on the east by the territories of Chaco and Formosa. *Jujuy* is one of the most northerly towns in the republic, being situated in 24° S. and 65½° W., on the verge of the tropic, but at an altitude of 4,050 feet, on an undulating plain surrounded by mountains. Mining is carried on in the province together with a certain amount of agriculture. Sugar-cane is grown extensively, as well as coffee and tobacco, and there are forests of timber trees.

The Territories.—Taken as a whole one quarter of the inhabitants of the Argentine Republic live in the larger towns of the federal provinces. Of the total population in 1895 only 103,400 were returned as inhabiting the nine national territories (giving a density of population of 0·1 per square mile), although the total area of these territories is more than twice as great as that of the fifteen federal provinces which had a density of population exceeding 7 to the square mile. The three northern territories, Misiones, Chaco and Formosa, are tropical. South of the provinces there are six territories, the Pampas and Neuquen, next to the settled portion, those of the Rio Negro, Chubut and Santa Cruz in Patagonia, and the isolated eastern half of Tierra del Fuego in the far south.

STATISTICS.

	1869.	1895.	1900.
Area of the Argentine Republic, square miles	1,135,840	1,135,840	1,135,840
Population of the Argentine Republic	1,877,490	4,044,911	4,894,149
Density of population per square mile	1	4	4
Number of foreigners in the Republic	—	1,004,527	—

POPULATION OF THE CHIEF TOWNS.

	1895.	1901.		1895.	1901.
Buenos Aires	663,854	836,381	La Plata	43,406	35,410
Rosario	23,169	112,461	Mendoza	28,808	29,500
Cordoba	42,783	50,000	Santa Fé	22,244	25,500
Tucuman	34,297	50,000	Parana	24,099	25,000

ANNUAL TRADE (*in pounds sterling*).

	1871–75.	1881–85.	1891–95.
Imports	11,900,000	15,300,000	19,800,000
Exports	8,700,000	13,200,000	21,500,000

STANDARD BOOKS.

W. H. Hudson. "The Naturalist in La Plata." London, 1892.
——— "Idle Days in Patagonia." London, 1893.
M. G. and E. T. Mulhall. "Handbook of the River Plate." London, 1893.
C. Wiener. "La Republique Argentine." Paris, 1899.

II.—URUGUAY

By Alexander F. Baillie,
Consul for Paraguay in London.

Position.—The official name "La Republica Oriental del Uruguay," or Republic on the eastern bank of the river Uruguay, very clearly locates the position of this small South American State, lying south of Brazil between the 30th and 35th degrees of south latitude and 52nd and 58th degrees of west longitude. On three sides it is bounded by water; on the east by the Atlantic Ocean, and on the south and west by the rivers Plate and Uruguay which form the division between it and the Argentine Republic.

Configuration.—The country on the coast of the Atlantic and river Plate may be regarded as a gently undulating plain covered with magnificent pasture lands, well watered but sparsely timbered ; while in the interior it is broken by several low mountain ranges, rising to an elevation of little more than 2,000 feet, and the forests are larger, though the trees are nowhere of any great size. The mountain chains form the watershed of the numerous rivers that intersect the land. The Uruguay itself, from which the republic takes its name, has its origin in Brazil and is upwards of 1,000 miles in length, but navigation is impeded by the lofty cascade at *Salto*, a town of some importance, situated about 20 miles below the river Arapey, and about the same distance above the Daiman, which are tributaries draining the surrounding mountainous ranges into the main river. Other tributaries are the Queguay and the Rio Negro, the latter of which divides the whole country from north-east to south-west into two nearly equal portions. The Santa Lucia and San José unite together and flow into the river Plate above Montevideo, while the Yaguaron, the Tacuari, and the Cebollati drain the area east of the Cuchilla Grande, and feed the great lake of Merim, which is partly situated in Brazil, and is a remarkable hydrographical feature on the eastern side of the country.

Climate and Resources.—The climate is mild and healthy. The cold is never excessive, and frosts are unknown ; in summer the heat is intense, but is tempered by the breezes from the Atlantic Ocean. Uruguay has no Indians on the frontiers to disturb the peace, and it has no ferocious animals to devastate its flocks and herds. It is a remarkable fact that the Biscacha, or Peruvian hare, which burrows the land in all directions on the western side of the Uruguay to the great detriment of sheep and cattle-farmers, has never been found on the eastern border of that river. The only indigenous mammal of any size is the *Cervus campestris*, a species of deer common to all the pampas of the river Plate. The capybara, or water-hog, is the largest rodent in the world. Birds are numerous, and include ostriches (*Struthio rhea*), vultures, and carrion-feeding hawks, great numbers of ground-partridges (*Northura major*), and a variety of song birds, among which the most remarkable is a mocking-bird called by the inhabitants "Calandria." The rich undulating pasture lands are well adapted for the breeding of vast herds of horned cattle, which are said to be larger, and to carry a heavier hide than those in the neighbouring Argentina, on account of the phosphates and alkaline silicates in the soil, but the sheep are smaller, and the wool inferior in quality. Moreover the plains are better timbered than the true pampa of Buenos Aires, and the trees, although stunted and of small value in themselves, afford protection to the herds from the great heat of the sun. The breeding and slaughtering of cattle are the most important occupations of the inhabitants, for very little has been done in the promotion of agriculture. Paysandú, on the river Uruguay, and Montevideo, the capital, are the great centres of the "Saladero" business. At the former, about 250,000 head of

cattle are killed annually, and the carcases are prepared to meet the requirements of the different markets to which they are consigned. "Carne seca," or sun-dried beef, is largely exported to Brazil, while corned-beef and tinned ox-tongues find a ready sale in Europe. At Fray Bentos, south of Paysandú, there are large establishments for the manufacture of extracts of meat, which, with hides, tallow, horns, bone-ash, wool and sheep skins, are the principal articles of export trade

Gold, silver, iron and copper ores occur over a large area. The riverine department of Salto yields jasper, porphyry, alabaster and agate, which are exported, chiefly to Germany.

People and Government.—The original stock of the present population of Uruguay differed widely from that of the neighbouring republics. The latter are inhabited by races which have sprung from the alliances of the European conquerors with the aborigines, but the early settlers in the Banda Oriental were already a mixed race at the time of their advent. The City of Montevideo was founded in 1717, as a military outpost, by the Royal Governor of Buenos Aires, and so remained until 1726, when a large immigration from the Canary Islands took place. The inhabitants of these islands were descendants of Spaniards and of the native "Guanchos," mingled also with Norman, Flemish and Moorish blood. The aboriginal Guanchos were a brave, peaceful shepherd race, who regarded the trade of "butcher" as being so degrading and ignominious, that no member engaged in that occupation was permitted to associate with his fellow countrymen. The fact is noteworthy, seeing that the descendants of these people are probably the greatest cattle-slaughterers in the world. In 1821 the country was annexed by the Empire of Brazil, but in 1828 its independence was recognised, and was guaranteed by the British Government. Of the people 70 per cent. are native born, the residue consisting of Europeans of several nationalities, but chiefly Italian.

FIG. 413.—*Average population of a square mile of Uruguay.*

Government and Towns.—The administration consists of two Houses of Parliament, the Senate and the Chamber of Representatives, and the Executive is given by the Constitution to a President who is elected for four years. Uruguay is, however, one of the worst governed of all the civilised nations of the world. The administration is in the hands of a few individuals who have the control of the army, and who make and unmake the Presidents, of whom no less than three have been assassinated during 30 years. The language spoken is Spanish, and the State religion is Roman Catholic, but there is complete toleration. The republic is divided into nineteen departments.

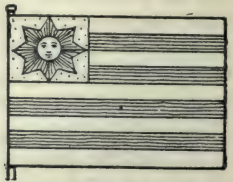

FIG. 414.—*The Uruguay Flag.*

Montevideo, the capital, takes its name from the Cerro, or Mount, which stands at the extremity of a semicircular bay. The city is built on a promontory between the bay and the estuary of the river Plate. If a breakwater, which is urgently required, could be constructed for the protection of shipping, it would become one of the most important cities on the eastern coast of South America. The largest inland town is *San José*, 50 miles from the capital, and *Colonia* on the river Plate, *Paysandú*, *Salto*, *Fray Bentos*, and *Santa Rosa*, all do a considerable trade, but in no case does the population of any one of them exceed 5,000.

FIG. 415.—*The Site of Montevideo.*

The means of communication in the southern districts of the State are fairly good—more than 1,000 miles of railway are open to traffic, and the more distant northern towns are connected with the railway termini by means of coaches. There are also over 4,000 miles of telegraph lines.

STATISTICS (*estimates*).

Area of Uruguay in square miles	71,700
Approximate population (1896)	840,000
Density of population per square mile	12
Population of Montevideo	243,000
Imports in dollars (1892-96)	22,000,000
Exports „ „	30,000,000

STANDARD BOOKS.

"Handbook of Uruguay" (Bureau of American Republics). Washington, 1892.
R. L. Lomba. "La Republica Oriental del Uruguay." Montevideo, 1884.
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III.—PARAGUAY

BY ALEXANDER F. BAILLIE,
Consul for Paraguay in London.

Position and Extent.—The name Paraguay was at one time applied to a very large portion of "the gigantic province of the Indies," as the Spanish possessions in South America were generally entitled in the reign of the Emperor Charles V. It formed a province of the Viceroyalty of Peru and included parts of the present republics of Bolivia and Brazil, and the whole of the vast area between those countries and the rock-bound coast

of Patagonia. International treaties, and armed conflicts, have from time to time reduced its limits, but its area is still considerably larger than that of Great Britain and Ireland. The country lies on both sides of the river Paraguay; the eastern portion of Paraguay proper, which is nearly in the shape of a parallelogram, lies between latitude 22° and 27° S. and longitude 54° and 58° W., while the triangular figure of Western Paraguay, or the Gran Chaco, extends from 25° to 21° S., and in longitude from 58° W. to an undetermined dividing line supposed to be about 62° W. The country is surrounded on the north and northeast respectively by Bolivia and Brazil, and on the south and west by the Argentine Republic.

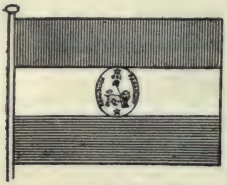

FIG. 416.—*The Paraguay Flag.*

Configuration and Rivers.—On the eastern frontier of Paraguay proper the low Sierra de Amambay stretches from north to south; it is crossed from east to west by several other chains of mountains, and is divided about latitude 24° into two branches, one of which takes a southerly course and forms the Cordilleras of Caaguazú, of Villa Rica and of Los Altos, while the other proceeding in an easterly direction under the name of the Sierra de Mbaracayú, crosses the Parana, and by creating an obstacle in that river forms the celebrated cataract of La Guayra or Sete Quedas. The altitude of these ranges nowhere exceeds 1,400 feet, but with the numerous spurs which spread from them, the whole surface of the country presents a continuance of undulations watered by innumerable rivulets and streams which in some places expand into swamps.

The hillsides and the great plains that they surmount are covered with majestic forests, interspersed with rich alluvial tracts, forming magnificent pasture lands for large herds of horned cattle, and offering vast areas of fertile soil for the cultivation of many of the most valuable products of the tropical and temperate zones. The Chaco, or Western Paraguay, has only been partially explored, and would appear to be an immense and fertile plain, with very few elevations, and large areas subject to frequent inundations. The great rivers Parana and Paraguay are the principal features in the hydrography of the country. They both rise in Brazil, and for a considerable distance flow in parallel courses from north to south on either side of Paraguay proper. The Parana is by far the larger, but is only navigable for a distance of 250 miles, while the Paraguay is accessible to vessels of light draught to a point 1,200 miles from the sea. The Paraguay receives numerous tributaries, the principal on the left bank being the Apa, Aquidaban, Ipané, and Tebicuari, which are useful for the transport of forest produce by boat and rafts, from short distances in the interior. Those on the right bank are the Rio Verde, Araguay, Confuso and Pilcomayo.

Climate of Paraguay.—The climate is hot and dry, but the winds, which are very variable have a great effect on the temperature. From

the south and south-west they are cool and refreshing, and the most trying are those from the north and north-east. In summer the temperature sometimes rises to 100° F., but seldom exceeds it, and the mean is 85° to 90°. In winter, that is to say from May to August, the mean is 62° to 65°, and sometimes it falls as low as 40°. Throughout the year, some sort of covering is required during the night, and in winter a thick blanket is very necessary. There is no fixed rainy season, but the fall is greater during the summer months, September to April, than in the winter, and offers the great advantage of neutralising the effects of the rapid evaporation produced by the rays of the sun in the hottest period of the year.

Flora and Fauna of Paraguay.—The country is so highly favoured by nature, and its innate resources are so great that when for some twenty-six years it remained under the remarkable tyranny of the dictator, Dr. Francia, and was prohibited from holding intercourse with other nations, it was not only self-supporting, but actually accumulated wealth. Its vast forests furnish timber in infinite variety adapted for all purposes, and unrivalled for elasticity, hardness and durability; textile and medicinal plants grow spontaneously; dye-woods, gums, cotton, indigo and india-rubber are found in their natural state; and groves of orange trees yield fruit unsurpassable in size and flavour; while wherever cultivation is attempted sugar-cane, tobacco, rice, mandioca, maize and many other products are raised in profusion. Yerba-maté (*Ilex Paraguaiensis*), or Paraguay tea, is a natural product of the soil, and is extensively consumed throughout South America. The gathering employs a large number of labourers, and the export tax placed upon it, adds considerably to the revenue of the State.

Animal life is abundant. Of wild animals, the jaguar, puma, tapir and ocelot are the most formidable, and deer of several species, wild boars and peccaries, the more numerous. The woods are full of monkeys; and there are said to be upwards of 450 distinct species of birds, the largest of which is the rhea, or American ostrich, and the smallest the viudita, a little parrot about the size of a canary. Brilliant macaws and jays, toucans with their enormous beaks, wild turkeys, and several distinct species of partridge are common. Alligators and carpinchos bask in the sun on the banks of the rivers and lakes, and fish of many kinds swarm in the waters. Snakes are both numerous and venomous. A remarkable feature of the inland waters is the existence of enormous water-serpents, which have been known to upset canoes, and drag the occupants below the surface.

The mineral resources of the country have never been carefully examined. A little gold is found, probably washed down from the province of Matto Grosso, in Brazil; but copper occurs in some places, and iron and manganese are spread over large areas.

People and History.—The indigenous inhabitants were tribes of the widespread Guarani nation, and were conquered in 1536 by a Spanish

expedition under the command of Juan de Ayolas, a lieutenant of Sebastian Cabot. Two remarkable incidents in the history of the republic have attracted world-wide attention; the domination of the Jesuits (1609–1767), and the long dictatorship of Gaspar de Francia (1816–1840). In 1865 a disastrous war was commenced with the allied forces of Brazil, the Argentine Republic, and Uruguay, which brought the country to the verge of ruin, and only terminated in 1870. The present form of Government is that of a democratic republic ruled by a President who is elected for four years, and a Congress consisting of a Senate and Chamber of Deputies elected by universal suffrage. The religion of the State is Roman Catholic, but all forms of worship are tolerated. Education is free and compulsory.

FIG 417.—*Average population of a square mile of Paraguay.*

Trade and Towns.—The principal industries are the distillation of spirits from sugar-cane; the fabrication of liqueurs, essences, oils, soaps and tans; the manufacture of cigars, earthenware, bricks and furniture; and the raising of herds of cattle. Hides, both green and dried, horns, bones and horse-hair are largely exported, and also tobacco, oranges, timber barks and yerba-maté, but the greater part of the products are introduced to the European markets as proceeding from the River Plate. *Asuncion*, the capital, is extremely well situated on the left bank of the Paraguay, which at this point is a thousand yards broad, in latitude 25° S. Other towns of lesser importance are *Villa Rica*, *Villa Concepcion* and *Villa del Pilar*. The total population, exclusive of the Indians of the Chaco, is 450,000. There is a regular service of steam vessels between the ports of the River Plate and Asuncion, and communications with the interior are maintained by means of the rivers, and by several good trunk-roads. There is also a railway 150 miles in length connecting Asuncion and Villa Rica, the second town of the Republic, and then diverging in a southerly direction towards the Parana with a view to its ultimately joining the Argentine railway system.

STATISTICS (*Estimates*).

Area of Paraguay in square miles	140,000
Population	450,000
Density of population per square mile	3·2
Population of Asuncion	45,000
„ Villa Rica	19,000

ANNUAL TRADE (*in* 1896).

Imports, £492,000. Exports, £454,000.

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IV.—THE FALKLAND ISLANDS

By the Editor.[1]

Position and Physical Features.—The Falkland Islands rise on the margin of the continental shelf of South America, east of the Strait of Magellan, between 51° and 53° S., and 480 miles north-east of Cape Horn.

The coasts are generally low and very much indented, especially on the outer sides of the principal islands where they are broken up into a number of jagged peninsulas, separating deep arms of the sea. East Falkland is almost cut in two by opposite gulfs, the connecting isthmus being only four or five miles wide. The surface is wild, rugged, in parts hilly, or even mountainous, rising in Mount Adam on West Falkland to over 2,300 feet. Quartz rock predominates in the higher parts, and clay slate in the lower, and among the geological puzzles of the islands are "stone rivers," lines of broken stones which in the course of time gradually make their way down hill without the aid of water. Peat is abundant and furnishes fuel. There are no trees, shrubs being the largest form of vegetation. Tussac grass growing in clumps to a height of six or seven feet, forms the characteristic feature of the flora, still abundant in the islets, though in the larger islands it has almost disappeared. There are extensive tracts of moorland, on which a species of cowberry takes the place of heather; grain and vegetables are scarcely cultivable. The only indigenous four-footed animal is a species of fox. Cattle, horses and sheep have been introduced. The last are now reared in large numbers, and constitute the chief wealth of the colony. Penguins and other sea-fowl are very numerous, and fish abound off the coasts.

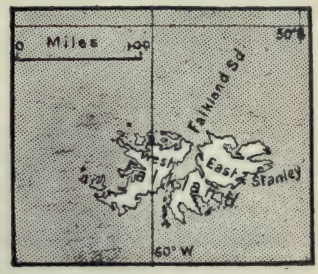

FIG. 418.—*The Falkland Islands.*

The climate, although not cold, is raw, and the summers are not genial. The mean annual temperature is about 42°, and often lower, with a mean range between 30° and 65°; the rainfall does not exceed 30 inches annually, but rain falls on two days out of every three and mist frequently prevails. Strong gales often occur.

FIG. 419.—*Badge of the Falkland Islands.*

History and Government.—The islands were discovered by Davis in 1592, but it was not until the latter part of the eighteenth century that any attempt was made at colonisation. French, Spaniards and English successively essayed to form settlements, and the islands were seized now by one, now by another of the rival Powers. At

[1] Assisted by E. J. Hastings.

last, in 1833, they were permanently taken possession of by the British Government for the protection of the whale and seal fishery in the Southern Ocean, and they were for some time used as a convict station. The Government is that of a Crown Colony. The inhabitants are almost entirely of European origin. The principal means of intercommunication is by water, for which the peninsular character of the islands affords great facilities. The islands are mainly of importance as a station for refitting and provisioning ships on the boisterous passage round Cape Horn. Sheep farming is the only important industry, and furnishes the staple export—wool, that of frozen mutton is increasing; the minor exports, hides, tallow, &c., are derived from the same source. Trade, which is in the hands of one company, is almost exclusively with the United Kingdom.

Stanley, the capital, seat of government, and only town, is situated on a nearly land-locked harbour on the north-east of East Falkland. There are facilities for repairing vessels. *Port Darwin*, a village on Darwin Harbour, at the head of Choiseul Sound, commemorates in its name the visit of Darwin, during the voyage of the *Beagle* in 1833.

South Georgia, an inhospitable and generally ice-bound land, with no permanent inhabitants, is a distant dependency of the Falkland Islands. It was discovered in 1675 by a French navigator, La Roche, and exactly 100 years later was taken possession of for the British crown, and named after the king. A German astronomical expedition visited it in 1882 to observe the transit of Venus, and remained till the following year.

STATISTICS.

	1881.	1891.	1901.
Area of Falkland Islands in square miles	6,500	6,500	6,500
Population of Falkland Islands	1,414	1,789	2,043
Density of population per square mile	0·2	0·3	0·3
Population of Stanley	700	694	916

CHAPTER XLVI.—THE UNITED STATES OF BRAZIL

By J. Batalha-Reis.

Name, Position and Extent.—The word Brazil comes from *brasil, brisil,* or *verzino,* the name of a dye-wood used in Europe in the Middle Ages, and applied to another dye-wood found in the American forests. The United States of Brazil occupy about one-half of South America, and extend across seven-eighths of its greatest breadth. The country is twenty-seven times as large as the United Kingdom, and larger than all Australia or the whole of Europe. It lies almost entirely between the tropics, and is crossed by the equator. Brazil and the territories included by the Plata-Paraguay, as shown in the accompanying maps, reproduce exactly the outline of the whole continent.

Orography and Hydrography.—Brazil is made up of highlands occupying 700,000 square miles, and forming an "Island," as it were, surrounded on the north-east and east by the Atlantic Ocean, and on the north-west and west by the continuous valleys of rivers, the Amazon-Madeira-Guaporé, and the Paraguay-Parana-Plata; and by lowlands comprising a large part of these valleys (the Amazon basin having an area of 1,900,000 square miles), including the southern slopes of the Guiana Mountains. The harbour of Rio de Janeiro, in the middle of the Atlantic coast of the Brazilian "Island," is the centre of a real mountainous region, the highest part of which, probably the highest of Brazil, the Itatiaia (Mantiqueira), is under 10,000 feet. This region is the last remnant of a colossal mountain mass, the worn-down fragments of which have formed the surrounding lands. The highlands grouped as water-partings, either stretching

FIG. 420.—*Configuration and Hydrography of Brazil.*

parallel to and along the sea-coasts, or diverging towards the interior, may be considered as forming three connected systems, the names of which often correctly characterise their geographical functions :—

(1) The Sea Mountains (*Serras do Mar*) or General Range (*Serra Geral*), form the south-eastern slopes of the great plateau of the Brazilian Island, towards a strip of lowland along the Atlantic. (2) The Backbone (*Espinhaço*), or Axis (*Espigão*), or *Serra Central*, is an extension of the Mantiqueira, and therefore of the maritime highlands southward towards the Uruguay, and northward in the basin of the São Francisco, which it separates from the rivers flowing more directly into the Atlantic. (3) The Water-partings (*Vertentes*) between north and south separate the basin of the Amazon-Tocantins and São Francisco in the north, and that of the Plata-Parana-Paraguay in the south. From these central highlands of the "Brazilian Island" the streams run into the deep surrounding valleys. On the north and north-east the rivers Tocantins-Araguaya, Xingu, Tapajoz, and Madeira flow to the Amazon ; on the south-west and south the river Guaporé flows to the Amazon, and the system of the Parana-Paraguay-Uruguay to the Plata. The north and north-east are partially drained by the São Francisco flowing to the Atlantic. The ancient mountainous cordillera is now worn down as the result of ages of denudation into vast plateaux, extensive elevated plains (called variously *Chapadões, Taboleiros, Campos, Geraes*), the more resistant parts of which project as sharp hills rather than real mountain ranges. The States of Minas Geraes and Goyaz, with a general altitude of some 3,500 feet, occupy the most elevated plateaux in the centre of the "Brazilian Island," followed westward by the Matto Grosso plateaux, averaging 2,500 feet and more, and in the extreme north-east by the lands draining directly northward to the sea which, from the upper Maranhão to Piauhy and Pernambuco, sometimes reach elevations of 4,000 and 5,000 feet. From the eastern slopes of the "Brazilian Island," south of the mouth of the São Francisco, shorter streams run straight to the Atlantic.

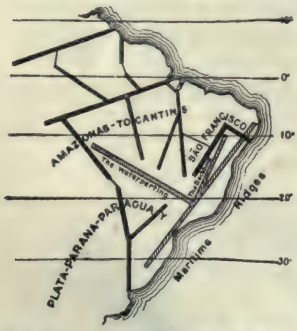

FIG. 421.—*Diagram of Hydrography and Orography of Brazil.*

Running from the Colombian Andes and the highlands of Venezuela and Guiana, the waters, in the northern part of the immense Amazon valley, gather into the rivers Içá, Japurá, Negro-Branco, Jamundá, Trombetas, and Jari. North of the mouth of the Amazon in the northernmost extremity of Brazil the Oyapok, Cassiporé, and other rivers run from the slopes of French Guiana to the sea. The highest valleys of the Guaporé and the Jaurú-Paraguay, with hardly four miles between, are often entirely covered by the same floods ; the Amazon is actually united to the Orinoco by the Rio Negro, through the Cassiquiare, to the Essequibo by

the Trombetas ; and the Tocantins is in permanent communication with the São Francisco by the Somno-Sapão. More than half of the surface of Brazil belongs to the Amazon-Tocantins basin ; about one-quarter to that of the Parana-Paraguay ; and the other quarter to the São Francisco and the shorter Atlantic rivers.

Geology and Minerals.—Two elliptical zones of Primary (Archæan-Palæozoic) rocks, which are in juxtaposition from north to south, are coincident from east to west, along the central region of the water-parting between the Amazon and Plata basins, forming, indeed, the central mountainous district of Rio de Janeiro, São Paulo, Minas Geraes, Goyaz, and Matto Grosso. These Primary zones surround respectively two central masses of Mesozoic lands. The northerly Primary zone is itself half encircled on the north and east by a long strip of Tertiary formations, intersected by Secondary rocks, north of which again Primary rocks form the slopes of Guiana, apparently separated from those of the "Brazilian Island" by the Tertiary and Quaternary deposits of the Amazon valley. The Paraguay-Parana basin and several smaller valleys are also covered with Quaternary sediments. In the central part of the Archæan formation, from the upper valley of the São Francisco to the sea, the gold and diamonds which once made Brazil famous were found *in situ*. But both gold and diamonds were at first, and are still, worked mainly in alluvial lands, principally in the vast region which has its centre in the district of Minas Geraes (*i.e.*, many mines), but which also stretches northwards to Bahia, westwards to Goyaz and Matto Grosso, and southwards as far as Rio Grande do Sul. In the same localities mercury, copper, zinc and manganese ores are found, and also the topaz, amethyst, tourmaline, beryl, agate and other precious stones, but never real emeralds. Large deposits of iron have been found, especially in Minas Geraes and São Paulo. Coal also seems to be abundant in the Carboniferous strata of São Paulo, Santa Catharina, and Rio Grande do Sul. Lignite exists in the Tertiary formation of the Amazon, Minas Geraes, and the east coast. The decomposition of the crystalline rocks (diorite, diabase, gabbro, melaphyre) produces red soil (*terra roxa* or *Massapé*) celebrated for its immense fertility.

FIG. 422.—*Geology of Brazil.*

Climate, Flora and Fauna.—With the exception of the three smaller southern States (Parana, Santa Catharina and Rio Grande do Sul), the whole of Brazil, ranging from 5° N. to 33° S., is included in the tropics: the vast region of the north in the great central valley of the Amazon lies right under the equator. Hence the climate is almost everywhere of the characteristic tropical type, except as modified by altitude. The combined influence of high temperature and constant moisture (the rainfall of the Amazon basin is excessive) produces extensive and complex tropical forests. These find their chief development in four regions—(*a*) In the vast Amazon valley surrounding the north and north-west of the "Brazilian Island" (called *Selvas* or *Hylæa*), where palm-trees (*Igapó*) grow from 60 to more than 200 feet high, often rooted beneath floods 60 feet deep. Amongst the characteristic species are the Mauritia, Copernicia, or wax-palm, Hevea, Hancornia, Micrandra yielding rubber, Cacao, and the Bertholletia giving Brazil nuts. (*b*) On the Guiana slopes. (*c*) On the banks of the deep valleys of the affluents of the Amazon, even in the heart of the "Brazilian Island," in the upper course of the Parana, and in the entire valley of the São Francisco. (*d*) On the Serras do Mar (*Mattas virgens*) where, amongst other species, Ipecacuanha, Pilocarpus, Jacarandá or rose-wood, Dialium ferrum, Cæsalpinia echinata giving Brazil dye-wood, and Araucaria flourish. The eastern forests are under the influence of the moisture-laden easterly trade winds wherever they blow perpendicularly to the coast, the prevailing directions being from south-east in the north, east in the centre, and north-east in the south. The dense forests of the great valleys are interrupted in certain parts of the Amazon valleys by savannas. The highlands of the interior of the "Brazilian Island" in Minas Geraes, São Paulo, Goyaz, and Matto Grosso have a less mild climate, and are covered with shrubs, arboreal cacti and grasses, intersected by subtropical forests. At the north-eastern extremity, in Ceará and Rio Grande do Norte, where the trade winds blow parallel to the coast an especially dry season occurs periodically from June to December every ten years. In the forests of the flooded valleys, plants, submerged at the base and mutually shaded, become creepers and epiphytes in order to reach the light of the Sun.

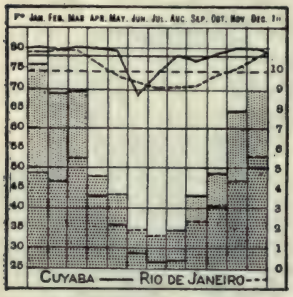

FIG. 423.—*Rainfall and Temperature in Brazil.*

The animals are also often modified for climbing or aquatic habits. Many species of monkeys, sloths, reptiles, humming birds and parrots are typical forms. The peccary, agouti, tapir, armadillo, paca, puma, coati, and the rhea, or American ostrich, are all characteristic of Brazil.

Aboriginal Peoples.—The tribes found by the European dis-

coverers, and still in existence, although all belonging to the American "Indian" stock, seem to have come from several different centres. Four great migrations have already been determined, one from the north, two from the south, and one from the east. The first line of migration was from north to south and south-west, by which the Nu-Aruaks (Maipure and Ipurina) came from the West Indies to the valley of the Amazon, diverging south-westwards to the rivers Japurá, Juruá, and Purus, and continuing southwards to the Paraguay. The Tupis or Guaranis moved from south to north and north-east from the Paraguay to the Atlantic, along the coast, and also gained the valley of the Amazon and Guiana by passing down the valleys of the Xingu and Tapajoz. The second migration from the south was that of the Caribs (Carahibs), who came northward and north-westward to the valleys of the Amazon (Japurá) and to Guiana. From the east the Gés (Aimorés, Acroá, Caiapó, and Botocudos in part) moved westward from the eastern half of Brazil and from the Maranhão to the Xingu, penetrated southward to Rio Grande do Sul. Many other tribes are only known by their more local movements, the chief amongst them being the Goitaca or Vaitaca, who migrated from northern Parahiba to the Rio Doce and Minas Geraes, and the many peoples of the interior of the Amazon valleys, such as the Miranyas, Panos, Caraya, and Guayacuru. The Gés seem to have been displaced by the migration of the Tupi, who formed most of the tribes found by the Portuguese explorers, and the Jesuit missionaries tried to introduce the Tupi dialect as a general Brazilian language. Some of the Tupi and other Indians were at first forced to work as slaves for the conquering Europeans, but were afterwards liberated, and in many places they have been from time to time collected in settlements or villages to be educated. Their place as labourers has been taken since 1549 by African negroes, who were introduced as slaves.

Present Population.—After four centuries of contact with European and African races the best known inhabitants of Brazil seem to exist in the following relative proportions—the Europeans being for the most part of Portuguese descent.

Europeans, (more or less pure).	Negroes.	Americans. Pure (*Caboclos*).	Americans. Mixed (*Pardos*).	Total.
38	20	4	38	100

FIG. 424.—*Average population of a square mile of Brazil.*

Many Indian tribes, still living in a state of native savagery, have never entered the Brazilian statistics, and are not taken account of. Towards the end of the sixteenth century the population of Brazil was estimated at some 60,000. In 1819 the first census showed 4,000,000 inhabitants, while in 1890 the population numbered about 15,000,000, having thus apparently quadrupled in seventy years. The immigrants, who form a great part of this increase, were principally Portuguese and Spanish. Italians have predominated during recent years,

and especially settled in the temperate southern States, São Paulo and Rio de Janeiro. In the south also some German agricultural and pastoral colonies have been established. These settlers continue to a certain extent to use their own languages; but the official language of the country is Portuguese, although considerably modified.

Phases of History.—The modern history of Brazil exhibits six distinct phases: (1) The struggle of the Portuguese against the French and Dutch for the possession of the newly discovered land; (2) the struggle with the South American Spaniards, and the question of boundaries; (3) the internal dissensions due to trouble with the Indians and Jesuits; (4) geographical and economical exploration and the question of slavery; (5) the growth of the provinces into the present quasi-autonomous States; and (6) Brazilian nationality and independence.

Discovery.—The northern coasts of what is now called Brazil were seen in January, 1500, by an expedition of Vicente Janez Pinzon, and had probably been sighted by other Europeans half a century or more earlier. The centre of what the Portuguese first called the "Land of the True Cross" (*Vera Cruz*), and afterwards, probably since 1503, "Brazil," was visited by Pedro Alvares Cabral in 1500 at Cabralia Bay in the south of the State of Bahia, which thus became the starting-point of Portuguese exploration and colonisation. By 1505 the whole coast from Maranhão to the Plata had been generally reconnoitred, and during the next few years many Portuguese settled in different parts of the new land and married Indian women. From 1532 to 1535 Brazil, then extending from the equator to 30° S., was divided into twelve parallel districts, each running due west from the Atlantic, but with unequal length of coast and indefinite hinterlands. These were called "Captaincies," and granted as sovereign fiefs to independent captains; more were subsequently created, but in the middle of the eighteenth century they all reverted to the Portuguese Crown.

Settlement and Exploration.—Two great centres of exploration were formed in course of time, Bahia in the north between 10° and 15° S., and São Vicente (afterwards São Paulo) in the south, between 23° and 25° S. In the coast regions of the northern division, including Bahia, Pernambuco, and Maranhão, which were the first discovered and the most intensely colonised up to 1680, the climate was hostile to the establishment of Europeans, and demanded the cultivation of tropical products. Plantations of sugar-cane, introduced from Madeira in 1532, and of cotton were accordingly established. The first important Portuguese settlement was at São-Salvador-da-Bahia-de-Todos-os-Santos (All Saints' Bay), which became the seat of the first central colonial Government in 1549. In the southern division (São Paulo and Rio de Janeiro), the white population took kindly to the new soil. The more temperate climate allowed all sorts of crops to be cultivated; and mines were discovered by the active exploration of the interior. A national Brazilian character was naturally formed

in these more favourable surroundings, and the centre of administration and economical activity was shifted in 1762 from Bahia to Rio de Janeiro. From the very first years of the discovery the Portuguese had to fight other European nations for the possession of Brazil. In 1504 the French commenced to trade to Brazil for dye-wood; subsequently they built forts and established a colony, but they were finally expelled in 1615. The Dutch made their first hostile appearance at the end of the sixteenth century. They afterwards took Bahia, and established themselves on the coast between the São Francisco and the Rio Grande do Norte; but in 1661 the Portuguese finally expelled them from Brazil. In 1640, at the time when Portugal ceased to be part of the dual Spanish Monarchy, Brazil was divided into two States and created a kingdom, united to Portugal and governed by a Viceroy. The interior had been already explored in many directions in the search for gold and emeralds, and for the purpose of procuring forced labour. In 1539–40 Orellana navigated the Amazon, in its most important branch, from Peru to Pará; and a century later its central course was again entirely visited by Pedro Teixeira. At the end of the sixteenth century the exploration of the São Francisco valley was commenced, and fifty years later the colonists of São Paulo reached northern Paraguay, and thence the high Andes of Bolivia, afterwards exploring Matto Grosso, Goyaz and Minas Geraes. From the end of the seventeenth and during the whole eighteenth century the exploration of the basin of the Amazon was actively continued. Of the more recent explorers in Brazil it is impossible even to record the names and dates; but, numerous as they were, and energetically as their explorations were carried on, great tracts of land still remain quite unknown.

Native Problems and Slavery.—In 1549 the Jesuits entered Brazil as missionaries, catechising the Indians, in many cases succeeding in collecting and fixing them in villages, opposing their employment and their subjugation to a formal state of slavery by the Portuguese colonists, but making them work for the benefit of their Jesuit churches and establishments. A long and terrible struggle was the inevitable result of this situation, and the Jesuits, who often allied themselves with the Spanish settlers of the south and west, were expelled from the southern province of Brazil in 1640 by the Portuguese colonists. They returned more than once until they were officially banished in 1759. The enslavement of the Indians was condemned by a Papal Bull in 1640, and abolished by law in 1680. Negro slaves from Africa, who had been employed ever since the middle of the sixteenth century, had, in the meantime, become very numerous. The struggles with the Jesuits led to wars with the Spanish colonies and States surrounding the south and west of Brazil, which lasted during the whole of the eighteenth, and part of the nineteenth century, often modifying the southern frontiers. The "Colonia do Sacramento" (founded by the Portuguese in 1680), which had grown to be the State of the "Banda Oriental," or Uruguay, became in 1821 the

"Cisplatine province" of Brazil, coveted by the Argentine Republic. A war between the two nations led to the ultimate independence of Uruguay (1825–28). The war between Brazil and Paraguay (1864–70) was the last episode of the great historical struggle. In 1830 the slave trade was prohibited. Between 1871, when there were 1,800,000 slaves, and 1888, when there were only 150,000, slavery was gradually but totally abolished. The ports of Brazil were in 1808 opened to foreign trade. Half a century later the navigation of the great affluents of the Plata, in 1866 that of the Amazon, the following year that of the São Francisco (up to Penedo) were declared free to all nations. The constitution of the republic and a law of 1892 reserved coasting and trade between Brazilian ports for Brazilian ships.

Independence.—From the middle of the seventeenth century movements towards independence can be traced in Brazil. In 1808 Queen D. Maria I., then insane, and her son, the Regent, transferred the Portuguese court from Lisbon to Rio de Janeiro, and remained in Brazil during the French occupation and the revolution which established parliamentary institutions in Portugal. On returning to Europe in 1821, King Dom João VI. left his son Dom Pedro as Regent of Brazil. But in 1822 the Brazilian Empire was established, and Dom Pedro proclaimed Emperor with a parliamentary constitution. In 1831 he abdicated, and his son Dom Pedro II. succeeded, and reigned until 1889, when the present republic of the United States of Brazil was proclaimed, each province becoming a State under a constitution which follows the type of that of the United States of America.

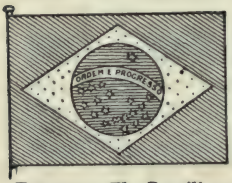

FIG. 425.—*The Brazilian Flag.*

Resources and Trade.—Even in the sixteenth century a current rumour pointed to the existence of a golden centre (*El Dorado*) in the Guiana mountains. Gold was, however, first discovered in São Paulo in 1560. Up to the middle of the eighteenth century gold and diamonds were found and worked in the province of "Minas," which was named from the fact. Coffee was introduced in the plantations of Rio de Janeiro and the south of São Paulo in 1761. From the remarkable prosperity of this crop Rio de Janeiro became the economic centre of Brazil, and now coffee is the staple production of the country as far as export is concerned, the railway system having been largely developed in order to provide communication between the plantations and the seaports. India-rubber, collected on the Amazon from wild trees, is also of great importance. The trade of Brazil is mainly carried on with the United Kingdom, the United States, Portugal, Germany and France. Most imports are subject to a very high tariff.

Natural Regions and Political Divisions.—The twenty-one States or main divisions of Brazil correspond to a great extent with natural

regions, and can easily be considered in six natural groups : (i) The valley of the river Amazon is now divided into two States, the lower part forming Pará, the upper Amazonas. (ii) South of these the lands which slope up from the Amazon plain to the plateau, forming all the vast western hinterland, belong to the State of Matto Grosso, and the heart and hydrographic centre of the "Brazilian Island" is the State of Goyaz. (iii) Along the north-eastern coast and stretching inland from it the comparatively small States of Maranhão (part of which is a continuation of the Amazon and Tocantins plain), Piauhi, Ceará, Rio Grande do Norte, Parahiba, Pernambuco, Alagoas, and Sergipe, succeed one another from north-west to south-east. (iv) The two large central States of Bahia and Minas Geraes occupy the valley of the São Francisco and other rivers draining to the Atlantic. In these the mining and industrial activity of historical and modern Brazil has been to a great extent concentrated. (v) The small State of Espirito Santo and the State and Federal District of Rio de Janeiro bordering the coast just within the tropic, form the political centre of Brazil, and a sort of transition to the more temperate climates and the more European population of part of São Paulo and the whole group of (vi) southern States, Parana, Santa Catharina, and Rio Grande do Sul.

Amazonian States.—The vast inland plain, all nearly on the same level as the central part of the Amazon valley between the rivers Branco and Madeira, forms the State of (1) **Amazonas,** a region of dense tropical forests, thinly peopled by uncivilised Indians. It is like a palmately or digitately-veined leaf, its principal ribs, besides the central course of the Amazon, being the rivers Negro on the north and Madeira on the south, on which secondary tributaries, themselves great rivers, are pinnately inserted. *Manaos*, near the confluence of all the converging waters, is the capital of the State, and the natural hydrographic and economic centre of the immense region, which can be traversed only by its waterways. Steamers run on the main rivers, and native canoes follow the smallest branches. The valley of the Trombetas on the north and that of the Tapajoz on the south, divide the State of (2) **Pará,** which occupies about one-third of the whole valley of the Amazon. The highlands project from both sides and constrict the valley between Obidos and Santarem at the western extremity of the State. The capital, *Belem* or Pará, seventy miles distant from the Atlantic, stands on the right bank of the Tocantins. This river is in direct communication with the great stream of the Amazon proper, and really forms part of its system, being only divided from it by some islands, the largest of which is Marajó. The mouth of the river Pará or lower Tocantins has been, up to the present, the real maritime and commercial entrance of the Amazon, Belem being therefore the exporting centre for the rubber, vanilla and other products of both the Amazonian States.

Central States.—The State of (3) **Matto Grosso** occupies the slopes which lead from the low valley of the Amazon to the plateau of the

"Brazilian Island," and the whole western part of the latter, with a mean altitude of 3,000 feet. It occupies nearly one-half of the total width of Brazil, from Bolivia to the river Araguaya, and more than one-half of its length, from the middle Tapajoz and Xingu to the middle Parana at the republic of Paraguay. This State is almost without inhabitants, and much of it is still unexplored. The capital, *Cuyabá*, and some few settlements, are on the rivers of the Paraguay hydrographic system, therefore the principal commercial outlet is naturally towards the Plata. The State of (4) **Goyaz** is almost exclusively formed by the great valleys of the rivers Tocantins and Araguaya, south of their confluence, stretching for 15° of latitude from north to south through the water-parting (*Vertentes*) in the Santa Martha and Pyrenee ranges (which reach 4,500 feet), down to the northernmost branch of the hydrographic system of the Parana. Goyaz is not so devoid of population as Matto Grosso. The capital, *Goyaz* (formerly Villa Boa), is very remotely situated in the central region whence the waters flow to the Amazon and to the Plata.

North-Eastern Littoral States.—In the extreme north-east the Parnahiba, which carries the greatest volume of water of any river between the valleys of the São Francisco and the Tocantins, forms the eastern border of the State of (5) **Maranhão,** the littoral of which is a continuation of the Amazon forest zone. The higher lands form savannas, with an average height of 800 feet, which are continuous on the west with those of Pará. The capital, *São Luiz*, is on an island in São Marcos Bay, at the common mouth of numerous rivers which drain the whole State from south to north, and form, on approaching the sea, a large, low and swampy region, edged by many small islands. The eastern half of the basin of the Parnahiba forms the State of (6) **Piauhi,** which has a coast-line of only eighteen miles, scarcely more than part of the mouth of the river, but expands broadly to 380 miles towards the south. It is covered with forests in the lowlands and with shrubby catingas on the higher lands; and is only thinly peopled. *Therezina*, the capital, was established far inland where the Poti, the most important tributary, coming from the north-east enters the Parnahiba. The State of (7) **Ceará**, on the east, occupies the basin of the Jaguaribe, and has a long coast-line on the Atlantic with few harbours. At *Fortaleza* (or Ceará), the capital, cargo has to be landed in surf-boats on the beach. The State of (8) **Rio Grande do Norte** in the north-eastern angle of Brazil includes Cape São Roque, and occupies the valley of the lower Piranhas and other streams. Its capital is the small port of *Natal*. The State of (9) **Parahiba do Norte** follows to the south, occupying the valleys of the upper Piranhas, Parahiba and other streams. The three States last named are alike in sharing a low forest-clad coastal plain which rises to a mountainous region of savanna character where they meet on the watershed in the interior. The important State of (10) **Pernambuco,** with over a million inhabitants, covers the space between the eastern curve of the São Francisco and the north-eastern highlands of Brazil.

Its capital, Pernambuco or *Recife* (named from the reef which guards its harbour), in front of Olinda, at the mouth of the Capiberibe, is a seaport doing a large trade, and the centre from which a fairly complete railway system penetrates the State and brings down the produce of numerous rich plantations of sugar and cotton. The interior land is formed by savannas, with a mean elevation of between 1,500 and 2,000 feet, but tropical forests clothe the eastern slopes. The island of Fernando de Noronha, which lies 340 miles off the coast to the north-east, and is used as a convict station, is officially a part of this State. The last two littoral States of the north-eastern group are very small and lie one on either side of the lower São Francisco. They are (11) **Alagoas** on the north, and (12) **Sergipe** on the south, the smallest in all Brazil.

Central Eastern States.—In the very centre of the eastern zone of the "Brazilian Island," and both limited to the west by the elongated region of Goyaz, the two great States of Bahia and Minas Geraes occupy successive sections of the wide valley of the São Francisco, and of the eastward slope of its eastern watershed. The State of (13) **Bahia** may be divided into two different regions—(*a*) the middle and northern part of the São Francisco valley and (*b*) the valleys of the littoral rivers Itapicuru, Paraguassu, Contas and Pardo. Its capital São Salvador da Bahia, or simply *Bahia*, which was the first capital of colonial Brazil, lies on the south-eastern side of the vast Bay of All Saints. It is the second harbour of Brazil, and continues to be one of the most important towns, and the residence of the Roman Catholic Primate. The lands around the bay, enriched by the *massapé* soil, are of extreme fertility and covered with plantations of sugar-cane, tobacco and other products. The most populous State in Brazil is (14) **Minas Geraes,** which lies entirely inland, and is penetrated only on its margins by railways from the seaports of Rio de Janeiro and São Paulo. It is formed of three different regions—(*a*) the higher basin of the São Francisco and Parnahiba with its mountainous borders rising to elevations of from 3,000 to 5,000 feet; (*b*) the higher valleys of the Jequitinhonha and Doce which rise in the Espinhaço and flow eastward to the Atlantic; and (*c*) the valleys of the higher Rio Grande-Parana. This State is the richest part of Brazil as regards mineral resources. *Ouro Preto*, which succeeded the old and rich centre of mining Brazil, *Villa Rica*, is still its principal town; but the official capital of the State was recently removed to *Bello Horizonte*. Plantations in the south, and cattle-breeding, have more recently acquired importance.

South-Eastern States.—The littoral of Minas Geraes, between the Serra do Mar and the sea, forms the small State of (15) **Espirito Santo.** To the south of it follows the very small State of (16) **Rio de Janeiro,** formed by the highest mountains of Brazil at an angle where the coast turns from a southerly to a south-westerly trend. It is the most densely-peopled of the Brazilian States, and the best served by railways. The capital is *Petropolis* on the mountainous district. On the grand bay of Rio

de Janeiro, facing *Nictheroy*, is the largest city of South America, São Sebastião do Rio de Janeiro, familiarly known as *Rio*. Surrounded by

Estrella
Suruhy
Magé
Petropolis
Inhomirim
Gorvenio
Iguassú
Macacos
Jacarépaguá
Tijuca
Gavea
Lagoa
Corcovado
RIO
Nictheroy
S. Christovão
Jurujuba
Catete
Botafogo
Ilha do Governador
Ilha do Governador
Ilha Fundão
Ilha Fundão

seems to be only attached to the rest of Brazil by the Serra do Mar as by a narrow isthmus. This is (21) **Rio Grande do Sul** (or São Pedro do Rio Grande do Sul), drained by the river Ibicui, which belongs to the Uruguay system, and by the Jacacahi-Jacuhi flowing to the great lake of Patos, a littoral lagoon, at the northern end of which, *Porto Alegre*, the capital, is established. At the mouth of the lagoon, in the south, *Rio Grande do Sul* is an important seaport. Another lagoon, Lake Mirim, also stretches along the Atlantic. Like the other southern States it prospers by cattle-raising on its extensive pastures. There are many German settlers.

STATISTICS.

	1890.
Area of Brazil in square miles	3,209,878
Population of Brazil	14,332,530
Density of population per square mile	4·5

THE STATES OF BRAZIL IN 1890.[1]

State.	Area in square miles.	Population.	Density of Population.
Amazonas	732,500	148,000	0·2
Matto Grosso	532,700	93,000	0·2
Pará	443,600	327,000	0·7
Goyaz	288,500	227,500	0·7
Minas Geraes	222,000	3,184,000	14·3
Maranhão	177,600	431,000	2·4
Bahia	164,600	1,820,000	11·0
Piauhi	116,000	267,500	2·3
São Paulo	112,300	1,385,000	12·3
Rio Grande do Sul	91,300	897,500	9·8
Paraná	85,400	249,500	2·8
Pernambuco	49,600	1,030,000	20·7
Ceará	40,200	805,500	20·0
Parahyba	28,800	457,000	15·7
Santa Catharina	27,400	283,500	10·3
Rio de Janeiro	26,600	977,000	36·6
Alagoas	22,600	511,500	22·1
Rio Grande do Norte	22,200	268,000	12·8
Espirito Santo	17,300	136,000	7·2
Sergipe	7,370	311,000	42·2
Federal District	538	522,600	971·5

POPULATION OF THE CHIEF TOWNS.

	Estimate 1883.	1892.		Estimate 1883.	1892.
Rio de Janeiro	350,000	522,600	Parahiba	?	40,000
Bahia	140,000	200,000	Maranhão	35,000	38,000
Pernambuco	130,000	190,000	Ceará	?	35,000
São Paulo	40,000	100,000	Pelotas	45,000	30,000
Belem	40,000	65,000	Ouro Preto	20,000	22,000
Porto Alegre	35,000	55,000			

ANNUAL TRADE (*in pounds sterling*).

(*Largely Estimates.*)

	1871–75.	1881–85.	1891–95.
Imports	19,000,000	21,350,000	30,000,000
Exports	22,500,000	23,200,000	35,500,000

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[1] A census was taken in 1900, but the results were considered fallacious and not accepted officially.

CHAPTER XLVII.—NORTHERN SOUTH AMERICA

I.—THE COLONIES OF GUIANA

By J. Rodway,
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BRITISH GUIANA

Position and Surface.—British Guiana, the only British possession on the South American continent, lies between Dutch Guiana and Venezuela, from which latter its line of division was settled by a tribunal of arbitration in 1899. From the river Corentyne, which divides it from Dutch Guiana, to Point Playa, which was fixed as the northern boundary, the coast-line extends to a length of about 250 miles; the depth of the colony inland to the sources of the Essequibo river is about 600 miles. The newly defined area of British Guiana is shown unshaded in Fig. 427.

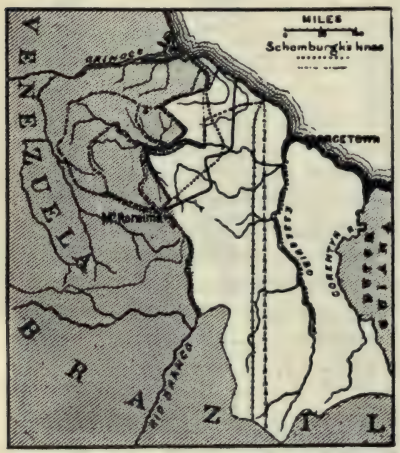

FIG. 427.—*Some of the boundaries suggested between British Guiana and Venezuela.*

For fifty miles from its flat alluvial shores the sea is discoloured by the immense volume of muddy water poured in by its rivers. Hardly rising above high water mark, the coast for about twenty miles inland was once nothing more than a mangrove swamp in front and a sedgy morass behind; but this has been changed to a great extent through the ingenuity of the first possessors of the colony, the Dutch, who, imitating the dams and dykes of their mother country, succeeded in empoldering the greater part of the coast, and in laying out a line of sugar and cotton plantations. Cotton has, however, long been abandoned, and sugar has probably seen its best days; nevertheless, this line of empoldered land, which rarely extends beyond five miles from the shore, is virtually the only portion of the colony under cultivation and almost the only part inhabited. Behind this depth of alluvium come reefs of white quartz sand, the sea beaches of some former age, and beyond these again a rocky, hilly country covered

with primeval forest, only in the far interior broken by open savannas on a sandstone formation. The rocks belong to ancient igneous and sedimentary formations, consisting mainly of granite, quartz, and red and white clays, in which gold is found.

Rivers and Mountains.—The longest of the rivers is the Essequebo which rises in the extreme south almost on the equator, and, including its numerous windings, is over 600 miles long; the Corentyne is about the same length, the Berbice 400 miles, and the Demerara 250. Other rivers are the Barima, Waini, and Pomeroon, besides which there are the two great affluents of the Essequebo, the Cuyuni and Masaruni as well as hundreds of smaller rivers generally called creeks. The Corentyne, Berbice, Demerara, and Barima are navigable for over a hundred miles from their mouths, but the Essequebo, Cuyuni, and Masaruni are obstructed by rapids about fifty miles up. The joint estuary of the three last-named rivers, which is about 20 miles broad, contains a large number of islands, the largest of which are Wakenaam, Leguan, Hog Island, and Troolie Island.

There are three principal ranges of mountains in the west, the Acarai, Pacarima or Humirida, and Canuku. The culminating point of the Pacarima is the famous Roraima, 8,740 feet in height, the upper portion of which is an immense rock rising with precipitous sides about 1,500 feet above the slope. Other mountains range from 3,000 to 4,000 feet and those in the Pacarima, of sandstone formation, are exceedingly picturesque from the weathering of the rocks, and the number of falls and cataracts on the rivers.

Climate and Vegetation.—The climate, from the position of the colony, 1° to 9° N., is naturally hot; owing to the heavy rainfall, which sometimes amounts to 140 inches in a year, it is moist, and in the forest steamy. Nevertheless, as there is no appearance of aridity, and as on the coast there are always sea breezes to moderate the temperature, the heat is never unpleasant. The range of the thermometer is from 74° to 90° F., but it more commonly remains at 80° to 82°. Unlike the West Indian Islands the colony is perfectly free from hurricanes and earthquakes.

The forests, which cover the greater portion of the interior, are peculiarly interesting to the naturalist from the multiform character of the vegetation, and the beauty and variety of the quadrupeds, birds and insects. The most interesting of the higher animals are the tapir, the cavies (allied to guinea-pigs), the ant bear, and the series of cats which culminates in the jaguar or American tiger. Alligators and immense fish swim in the rivers, and parrots, macaws, toucans and humming-birds perch upon and hover about the trees. Epiphytal orchids and monster creeping plants deck the branches, and on the river banks palms, tree ferns, and aroids decorate the foreground. From the Berbice river the huge Victoria Regia water-lily was first brought to Europe, to be afterwards distributed over the whole civilised world.

People and History.—The inhabitants are varied in race as well as nationality. The native Indians belong to several tribes ; some of them live in much the same condition as their forefathers did when America was discovered. The Africans are represented by a few thousand real Guinea negroes, and a hundred thousand born in the colony ; Asiatic races are represented by almost as many East Indians (introduced to work on the plantations), as there are negroes, and a number of Chinese ; while the Europeans are mainly Portuguese and British.

The colony originally consisted of two settlements on the Essequebo and Berbice rivers, founded early in the seventeenth century by the Dutch, to which, in 1745, that on the Demerara was added as an offshoot of the first. Essequebo and Demerara were for a long period under the control of the Dutch West India Company, which also owned Berbice, but having granted that river as a fief to another mercantile company it was quite independent. The settlements suffered much at different times from privateers, and in 1781 they fell into the hands of the British, to be recaptured, however, the following year by the French allies of the Dutch. They were again captured by the British in 1796, given up at the Peace of Amiens in 1802, and a third time captured a few months later in 1803, to be finally ceded to the British at the Peace of 1815. The colony, which was first called British Guiana on the union with Berbice in 1831, is administered by a Governor and Executive Council nominated by the British Colonial Office ; there is a legislative body of eight officials and eight electives called the Court of Policy to which is adjoined to vote supplies an elected body called Financial Representatives.

FIG. 428.—*The Badge of British Guiana.*

Commerce and Towns.—The most important industry is the growing and manufacture of sugar and its by-products, rum and molasses. The annual export of sugar in 1896–97 was a trifle over 100,000 tons. There has been a considerable reduction (about 30,000 tons) in the exports during the last few years, which, together with the great lowering of value, has caused much depression in the colony. Gold washing first became one of the industries of the colony about 1880, and the exports of 1897 were valued at over £400,000, but it has undergone no expansion since. Gold mining has been attempted, but hitherto without much success. It appears that two zones of gold-bearing strata extend in the west of the colony from Venezuelan to Brazilian Guiana ; in some places the "pay-dirt" is very rich, but on account of the long journeys in open boats, the danger of the rapids, and the drenching rains and floods, the diggings have not been fully developed.

Communication along the coast and for short distances up the principal rivers is carried on by a line of steamers ; there are good roads in the inhabited districts and two short railways. It is intended to run railways

along the whole coast line to connect with that on the east coast, and some of these extensions have already been commenced.

The colony is divided into three counties which correspond with the old settlements—Essequebo, Demerara, and Berbice, and retain these names. Demerara, being the most important, has long been used as a general name for the whole colony, *e.g.*, Demerara sugar, which is not simply the product of one county, but of all three. A portion of Essequebo known as the North-West District, lay within the territory disputed by Venezuela, and is under separate jurisdiction. *Georgetown*, Demerara, the capital of the whole colony, is situated on the right bank of the Demerara at its mouth, with a second frontage on the sea, where it is secured from inundations by a stone wall over a mile long. Like the other parts of the coast it is below high-water mark, and has to be drained by canals with sluices, which are opened at low water, and by steam pumps. Notwithstanding its flatness, the city is made beautiful by the number of palms and other trees planted in its streets and gardens, in fact when seen from the lighthouse it looks as if embosomed in a wood. The chief town of Berbice is *New Amsterdam*; in Essequebo is the small town of *Bartica*, a point of departure for the gold diggings, and there is the nucleus of a town in the North-West District called *Morawhanna*. Villages are numerous along the coast, where they generally alternate with the plantations.

British Guiana has been called a magnificent province. Although almost as large as the United Kingdom, hardly one-hundredth part of its area has been touched, and not one-tenth of the fertile alluvium is in cultivation. Enough sugar to supply the mother country could be easily grown; cotton, coffee, cacao, rice and tropical fruits also flourish to perfection. With all these advantages the colony is virtually at a standstill, mainly on account of the bounty system on beet sugar practised by the continental countries of Europe.

STATISTICS.

	1881.	1891.
Area of British Guiana, square miles	109,000	109,000
Population	252,186	278,328
Density of population per square mile	2·3	2·5
Population of Georgetown	47,175	53,176
„ New Amsterdam	8,124	8,903

COMPOSITION OF POPULATION IN 1891.

(*Native Indians excepted.*)

Negro and coloured.	East Indians.	Portuguese.	British and other Europeans.	Chinese.
144,617	105,463	12,166	4,558	3,714

ANNUAL TRADE (*in dollars*).

	1871–75.	1881–85.	1891–95.
Exports	12,500,000	13,000,000	11,000,000
Imports	9,500,000	9,500,000	8,500,000

DUTCH GUIANA

Position and Surface.—Dutch Guiana, known also as *Surinam*, is separated from the British colony by the river Corentyne, and from the French by the Marowyne. The coast-line is about 240 miles long, and the colony extends to about the same distance inland. What has been said of the physical geography of British Guiana applies also to the sister colony, for the geological formations, the forests, the climate, and rainfall of the whole country are identical. The principal rivers, besides those which form the boundaries, are the Suriname, Saramacca and Coppename.

The few white inhabitants are mainly Dutch, and speak the language of their country; the native Indians, who number about 12,000, are in a similar condition to those of British Guiana, and the negroes generally speak a jargon compounded of English, Dutch and African dialects, called *talkee-talkee*. Perhaps the most interesting people in the colony are the "bush niggers," descended from runaway slaves, who gave the colonists so much trouble in the latter half of the eighteenth century that the government was compelled to make treaties with them and give them large subsidies. Living in the forest, like the Indians, these people are savages of quite a different type, and are curious examples of the effect of a new environment on the uncivilised negro race.

History and Trade.—The colony was originally founded by Lord Willoughby, the British Governor of Barbados, in 1650, and was ceded to the Dutch in 1667 in exchange for what is now New York. Like the neighbouring colonies it suffered on several occasions from the raids of French privateers, and was captured by the British at the same time as its neighbour, but it may be stated that it was never so prosperous as when under British rule during the Napoleonic wars, and may now be considered much less prosperous than British Guiana, notwithstanding the depression of the latter. This is shown by the fact that the colony is subsidised by the mother country. It is administered by a Governor and Council.

The main product of the colony was originally sugar, but this has largely gone out of cultivation, to be partly replaced by cacao, coffee, and bananas. Balata, a kind of gutta percha, is largely exported, also timber and gold, of which last the production in 1899 exceeded £100,000. There are no local steamers, no railways, and the roads along the coast are not continuous. The capital is *Paramaribo*, conveniently situated at the junction of the Suriname and Commewine rivers, ten miles from the sea.

STATISTICS.

Area of Dutch Guiana (square miles)	46,060
Population of „ (1896)	62,499
Density of population per square mile	1·3
Population of Paramaribo (1896)	29,261

ANNUAL TRADE (*in pounds sterling*).

	1895.
Imports	460,000
Exports	430,000

FRENCH GUIANA

French Guiana, generally called Cayenne, is separated from the Dutch colony by the river Marowyne or Maroni, and from Brazil by the Oyapok. It has followed, therefore, that the contested territory between these rivers has, by agreement, been left as a neutral district until the matter is settled by arbitration, which it is understood will soon be done. Unlike the other colonies French Guiana has elevated land near the shore, and there are several rocky islands off the coast, but otherwise the geological formation is similar. The principal rivers are the Mana, Sinnamarie, Approuague, and Oyapok. Settlements were first made here by the British in the early part of the seventeenth century; French settlers were in the Sinnamarie in 1624, and in Cayenne in 1627, but it was not until after several failures that the present colony was established in 1664. Several unsuccessful attempts were made to establish settlements of Europeans during the eighteenth century, and ultimately, since the time of the Revolution when it was first used as a penal establishment, it has gained a bad name. Nevertheless it has all the capabilities of the other Guianas, and could be developed with advantage. The colony is administered by a Governor and sends one Deputy to the French National Assembly. There are but few plantations, and on these cacao is grown; the other products are gold, balata, phosphates from the islands, and anatto. Latterly the gold export has been very considerable, both from diggings, some across the Brazilian frontier, and from dredging in the river Sinnamarie.

The capital, *St. Louis,* is well situated on what is called the island of Cayenne, which, however, is only separated from the mainland by the branching of two rivers. The population of the town is increasing from the development of gold-mining.

STATISTICS.

	1877.	1895.
Area of French Guiana (square miles)	31,000	31,000
Population of "	23,663	22,714
" St. Louis (1895)	11,000	12,351

ANNUAL TRADE (*in pounds sterling*).

	1889.	1895.
Exports	170,000	374,400
Imports	360,000	457,500

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II.—VENEZUELA

By Dr. W. Sievers,
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Position and Natural Divisions.—Venezuela occupies the north of South America from the Gulf of Maracaibo, where it borders on the republic of Colombia on the west, to the Guiana plateau, where it meets British Guiana on the east. Southward it is bounded by Brazil. It is naturally divided into three parts: the highlands of Guiana, the great plains or Llanos, and the high mountain systems of the Cordilleran and the Caribbean Ranges in the north.

Venezuelan Guiana.—Very little is yet known of the interior of Guiana. It is generally supposed to be a system of crystalline mountains covered with enormous masses of Cretaceous sandstone. The sandstone masses form the highest summits in the east (Mt. Roraima, 8,530 feet), while overlying Cretaceous strata do not seem to exist in the west, the Sierra Maraguaca and Cerro Duida (each 8,200 feet) being apparently composed of granitic and gneissose rocks only. Towards the north the height of the Guiana mountains decreases considerably, and only monotonous hills of about 1,500 feet reach the Orinoco. The hills of inner Guiana are interspersed with luxuriant savannas, which are covered with grass more than ten feet high, and numerous shrubs, bushes, and herbaceous plants, remarkable for the extraordinary splendour of their blossoms. The inner parts of Guiana are pathless, and nearly inapproachable, owing chiefly to the numerous cataracts and rapids on the rivers. The west and north of Guiana is encircled by the Orinoco, the third in size of the great independent rivers of South America. Its sources lie in 2½° N. in the Sierra Parima; in its upper course the banks are grown with dense woods, but there are hardly any human inhabitants or animal life. After passing Esmeralda, the Casiquiare branch leaves the main river and flows to the Rio Negro; the tributaries Ventuari on the right, Atabapo, Inirida, and Vichada are received on the left, and the Orinoco leaves the woods near the mouth of the river Zama. It then breaks through the crystalline rock border of Guiana with the vast rapids of Maypures and Atures, receives the rivers Meta and Arauca on the left, and, increasing rapidly in breadth, turns towards the east even before receiving the Apure from the west. In its course to the sea the Orinoco seems to follow the northern slopes of the Guiana plateau, but in fact the channel is cut deeply into them; and various narrows (*angosturas*) are produced, the most famous one at Ciudad Bolivar. Near Barrancas the river begins to form its densely wooded delta of about the area of Wales.

The great gold mines of Callao, in the Yuruari territory, which produced nearly a million pounds sterling in 1884, have declined since 1887, and now yield only one-fifth of that amount. Forest produce is also collected and

exported. The only town is *Ciudad Bolivar* on the Orinoco, a river which is by no means the great artery of commerce it ought to be.

The Llanos.—In the west and north the Orinoco is surrounded by the llanos, extensive plains insensibly sloping down from 800 feet in altitude to the river. They are composed of detritus, gravels, sands, clay and ferruginous breccias, resulting from the denudation of the neighbouring mountain chains, and probably overlying Tertiary marine strata. The monotonous plains are cut by the rivers into portions called mesas, remarkable for dryness in comparison with the humid ground of the actual valleys. In the west, especially near the Cordillera, the plain produces extensive primeval forests or selvas, while in the State of Bermudez, between Maturin and Ciudad Bolivar, there is a typical desert, with drifts of sand and barren hills. The palma moriche (*Mauritia flexuosa*) borders the rivulets on the mesas in double rows, while groups of trees appear wherever subterraneous water exists. The scenery of the llanos therefore frequently resembles that of an English park. The principal river is the Apure; but the hydrographic axis is formed by the Cojedes and Portuguesa with the lower Apure into which they flow. Most of the rivers of the llanos converge to this line, which leads backward to the division between the Cordillera and the Caribbean Mountains. The Unare river is the only one whose valley penetrates deeply into the llanos from the sea, while in the east all the rivers flow eastward to the Orinoco delta and the Gulf of Paria.

FIG. 429.—*Average population of a square mile of Venezuela.*

The llaneros, or people of the llano, live chiefly by cattle-breeding, which is almost their only occupation, agriculture supplying only the barest necessaries of life. The settlements consequently are yards for cattle (*hatos*), taverns (*pulperias*), and small villages; larger villages and towns are very rare in the interior of the llanos, but on the northern border there are many. The principal river ports, *San Fernando de Apure* and *Nutrias*, export live stock and produce derived from them.

The Northern Mountains.—The mountainous country of the north consists of two principal sections—the Cordillera of Merida, with the mountain systems of Coro and Barquisimeto, in the west; and the Caribbean system, or the Venezuelan Coast Ranges, on the east. These chains are almost entirely interrupted at two points: in the continuation of the Cojedes-Portuguesa line between the Cordillera and the Caribbean system, in the west, where the elevation of the watershed is only 1,150 feet; and again on the coast between Cabo Codera and Cumand, where the Gulf of Barcelona invades a breach in the northern chain. A third breach separates the island of Trinidad from the mainland.

The Cordillera of Merida is a great folded chain, 15,400 feet in maximum altitude, with an Archæan crystalline zone in the centre, and two

sedimentary flanking zones of Cretaceous sandstones and limestones. The Cordillera, a continuation of the Colombian Cordillera of Bogotá, is free from all volcanic rocks ; the five highest summits of the most elevated mountain ridge, the Sierra Nevada de Merida, are covered with perpetual snow. The most important rivers are the Chama in the middle (on which *Merida* stands), the Motatan in the east (Trujillo) and the Torbes in the west (Tachira). Vast forests cover the northern and southern slopes of the Cordillera up to 10,000 feet ; higher up are alpine pastures, and the inhospitable páramos, and below 5,000 feet plantations, chiefly of coffee, sugar-cane, bananas, even of cacao, and fields of wheat and maize. Up to 8,000 feet beans, peas, potatoes and barley can be cultivated.

The population of the Cordillera contains more Indians and fewer negroes than any other district of Venezuela ; the former live chiefly in the highest, the latter in the lowest parts of the mountains, the white people occupying the intermediate zone. The exports, consisting especially of coffee and cacao, pass through the two principal commercial towns of *San Cristobal* and *Valera* to *Maracaibo ;* the railways employed are that from *Cúcuta* to *Puerto Villamizar* in Colombia, and that from *Valera* to *La Ceiba ;* the middle section from Merida has a tolerable outlet by means of the Santa Barbara railway.

The Northern Lowlands.—The lowlands to the north of the Cordillera form an enormous alluvial region, built up by the rivers which carry the detritus from the surrounding mountains into the depressed area between the Cordillera de Merida and the Sierra de Perijá occupied by the Lake of Maracaibo, which is decreasing in area as its margin is being silted up. The shallow, brackish lake is closed by a bar, which prevents the entrance of large vessels, nevertheless *Maracaibo*, as the capital of the State of Zulia, and principal port for the Cordillera de Merida and the adjacent parts of Colombia, has grown to be a considerable town. The bar separates the Lake of Maracaibo from the Gulf of Venezuela, which is surrounded by the peninsula of Guajira in the west, and by the coast of Coro and the peninsula of Paraguaná on the east. Both these peninsulas are built up of eruptive rocks and Tertiary strata ; they are dry and almost waterless, but have a numerous population. The Guajira aboriginal tribe have never been subjugated ; the Coro side is occupied by cattle-breeding Venezuelans.

The Coro Range.—The Cretaceous mountain system of Coro rises in its two principal chains to less than 5,000 feet. Between these chains a broad Tertiary plain of about 1,200 to 1,500 feet in elevation is traversed by the longest stream of western Venezuela, the Rio Tocuyo. Coro, or the State of Falcon, is divided into two quite dissimilar parts, the western as far as 69½° W. is covered with cactus, thorn-bushes, shrubs and dry woods, rain being rare, and water scarce ; agriculture, therefore, is little developed. The old town of *Coro*, founded in 1527, is in this district. The coast of the eastern part is fringed by coral reefs and mangrove woods, and unlike

western Coro, it suffers from immoderate rainfall, leading to inundations which discourage agriculture. *Tucacas*, the principal port of eastern Coro, is thriving, being connected by railway with the copper mines of *Aroa* and the capital of the State of Lara, *Barquisimeto*. The State of Lara, lying between the Cordillera, the Coro mountains, and the Caribbean ranges, resembles Coro in climate and vegetation. Its western part does not exceed 2,600 feet in elevation, is dry, and in the main waterless, although the river Tocuyo passes through it; the east, Yaracui, is a fresh, humid, wooded land, with large plantations of coffee and cacao trees.

The Caribbean Range.—The Caribbean system of mountains is separated by the depression of Barcelona into a western and an eastern section of similar structure. Both are composed of crystalline schists in two parallel eastward running chains, between which lies a hollow containing in the west numerous dry ancient lake beds, and one, the lake of Valencia, still filled with water. In the east, besides the Gulf of Cariaco, a great shallow lagoon and swampy lands separate the two chains. In both sections the northern chain forms the rugged coast of the actual ocean, the southern the former coast of the Tertiary Llanos Sea; but in the west the northern chain is the higher (Naiguáta reaches 9,127 feet, and Silla de Carácas 8,743 feet), while in the east the southern chain is the higher, with Turumiquire 6,562 feet. The eastern and western sections of the chain present many minor differences in geological and orographical structure, and they also differ in vegetation. In the east, forests are found only up to 2,600 feet, the higher parts being grassy pasture grounds, while the western part is richer in wood, and far better cultivated.

FIG. 430.—*The Railway from La Guaira to Carácas.*

The two principal towns of the republic, *Carácas* and *Valencia*, lie in the midst of the richest and most cultivated coffee regions of Venezuela, and so do many important provincial towns. The two chief ports, *La Guaira* (with Maiquetia) and *Puerto Cabello*, are connected by railway with Carácas and Valencia. Between the small port of *Carenero* at the beginning of the railway to the cacao centre of Rio Chico and Barcelona, the coast is a level shore without any important anchorage or settlement. *Guanta*, the best port of the east, is still almost tradeless, although it is connected by railway with *Barcelona*, the capital of the State of Bermudez, and the Cretaceous coal mines of *Naricual*. The trade of *Cumaná*, one of the oldest towns in America, is larger, but it has no railway con-

nections ; the principal road of the east of Venezuela leads from it through the dry and woodless mountains to *Maturin*. *Carúpano*, a mediocre port at the foot of the northern chain, exports cacao, the most important produce of the humid country near the canyons of the Gulf of Paria. Margarita, a double-topped island, composed of Archæan schists, is the highest (4,450 feet) of the coast islands, and is densely peopled, while the other small islands off the coast, forming the territory of Colon, have few inhabitants.

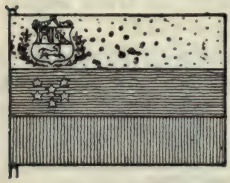

FIG. 431.—*The Venezuelan Flag.*

Government.—The United States of Venezuela are politically divided into nine States, five territories, and a federal district, Carácas and surroundings, with a constitution similar to that of the United States of America. The language of the country is Spanish, and the Roman Catholic religion prevails. The southern boundary is still unsettled. Coffee is the chief export of Venezuela, and is sent mainly to France, Germany, the United States, and Italy.

STATISTICS.

	1881.	1891.
Area of Venezuela (square miles)	594,000	594,000
Population of Venezuela	2,075,245	2,323,527
Density of Population per square mile	3	4
Population of Carácas		72,429
„ Valencia		27,538
„ Maracaibo		29,180
„ Ciudad Bolivar		12,877
„ Barquisimeto		9,093

Exports average £4,000,000 annually ; there are no recent statistics for imports.

POLITICAL DIVISIONS OF VENEZUELA IN 1891.

STATES.

Name.	Area sq. miles.	Population.
Los Andes (Cordillera)	14,700	336,146
Bolivar (Guiana)	88,700	56,289
Bermudez (Oriente)	32,000	300,597
Carabobo (Valencia)	3,000	198,021
Falcon (Coro)	10,000	139,110
Lara (Barquisimeto)	9,300	246,760
Miranda (formerly Guzman Blanco)	34,000	484,509
Zamora (Western Llanos)	25,000	246,676
Zulia (Maracaibo)	26,000	85,456

TERRITORIES.

Name.	Area sq. miles.	Population.
Distrito Federal (with Carácas)	45	89,133
Amazonas (Alto Orinoco)	200,000	45,197
Guajira	3,600	65,990
Yuruari	81,000	22,392
Delta (of the Orinoco)	25,000	7,222
Colon (Outer Islands)	166	129

STANDARD BOOKS.

W. Sievers. "Venezuela, mit einer Karte der Venezolanischen Cordillere." Hamburg, 1888.

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BOOK VI.—AFRICA

CHAPTER XLVIII.—THE CONTINENT OF AFRICA

By Edward Heawood, M.A.

Librarian to the Royal Geographical Society.

Position and Coasts.—Joined at its north-eastern corner to Asia by the Isthmus of Suez,[1] Africa forms a vast peninsula, of remarkably regular outline, stretching to the south-west of the great land mass of the Old World, and balancing, so to speak, the great island of Australia lying to the south-east. On its northern and north-eastern sides it faces, across comparatively narrow seas, portions of Europe and Asia respectively, while on all other sides it falls rapidly beneath the surface of the Atlantic and Indian Oceans. As is the case with South America the main mass of the continent runs from north to south, crossing the Equator near the middle of its length, and gradually tapering southwards. In its northern half, however, it has an important westerly extension forming a rounded limb which almost rivals in area the main southward-pointing portion, while on the opposite side a smaller, more tapering mass runs eastward in the shape of a blunted horn. The distance between the extremities of these two projecting segments is little less than the whole length of the continent from north to south. Lastly, in the north-west a narrow rectangular block projects somewhat beyond the general line of the northern coast, forming near its western end the nearest approach—at the Strait of Gibraltar—to the neighbouring continent of Europe.

Apart from these irregularities, the outline of Africa is remarkably uniform. There are no deep gulfs running into the land and consequently no well-marked peninsulas. Between the western and southern limbs runs the wide Gulf of Guinea, divided near its apex into two rounded bights, while on the north coast a shallow indentation forms the Great and Little Syrtes (Gulfs of Sidra and Gabes). Elsewhere the coast runs in gradual curves, broken on a minor scale only by inlets or projecting headlands. This uniformity is further seen in the absence of important islands. The one large African island—Madagascar—is separated from the continent by a channel far deeper than the Red Sea which separates Africa from Asia, and more continuously deep than the Mediterranean, the

[1] The Suez Canal, sometimes said to make an island of Africa, is such a mere surface scratch that it may be disregarded in considering the natural relations of the continents to one another.

dividing sea on the side of Europe; so that it stands in no close relation to the main continental mass. The islands which lie off the coasts are all of small size, and none of any importance occur round the whole southern coasts for a distance of 4,000 miles.

Relief.—A general sameness is also noticeable in the relief of the continent. Folding and crumpling of the surface strata seem to have played a much less important part in Africa than in other continents, and in consequence there is a marked absence of mountain ranges, as distinguished from irregular groups of mountains or isolated peaks. The typical form of surface is that of elevated plateaux, from the surface of which higher ridges or summits often rise abruptly. These plateau lands fill up the great bulk of the continent, their outer slopes or terraces occurring everywhere comparatively close to the sea and nowhere leaving room for extensive low plains. The highest ridges occur as a rule near the outer edge of the plateau, and round the outer escarpments there is generally a narrow fringe of lowland, but in places the highlands rise almost directly from the sea. In elevation there is an important distinction between the plateaux of the northern and southern halves of Africa, those of the north being, on the whole, far lower than those of the south. Drawing a curved line from the coast of the Red Sea in the east to the head of the Gulf of Guinea in the west, we may say that whereas land over 2,000 feet above the sea is the exception to the north, to the south it is the exception to find land below that elevation except close to the coasts.

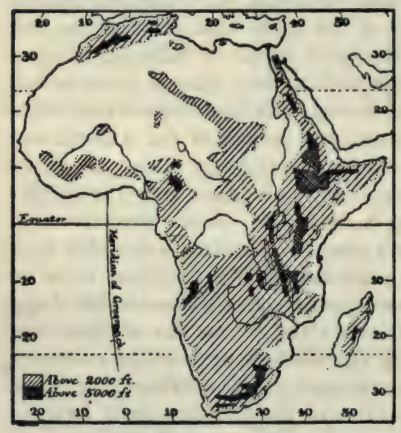

FIG. 432.—*The Configuration of Africa*

In spite of the lower average elevation of North Africa, it contains the Atlas, the one important mountain range. It runs parallel to the most projecting part of the northern coast, rising in its most pronounced, western, half to a height of 14,000 feet and more. Owing to its direction it does not help to form any well-marked peninsula such as that of Italy on the opposite side of the Mediterranean, though as it plunges below the sea to the east it forms, for Africa, an unusually prominent angle of the coast. To the south the Atlas falls suddenly, and near its eastern end there is a depressed area actually below sea-level; the range is therefore quite unconnected with any of the other highlands of North Africa. These occur chiefly in three lines with broad expanses of lower country between them. One runs nearly north and south along the western shore of the Red Sea; a second runs from north-west to south-east across the very

centre of northern Africa; while the third—wider but somewhat lower than the two first—forms a strip of plateau parallel to the northern shore of the Gulf of Guinea. The intermediate areas probably nowhere rise to a height of 2,000 feet except in isolated groups of peaks.

In the southern half of Africa the greater part of the plateau rises to an average elevation of little less than 4,000 feet. One noteworthy break in this uniform high level occurs in the western half, where, on either side of the Equator, there extends a vast circular basin, bounded on all sides by higher ground, which seems to represent the bed of an ancient inland sea. Abreast of this to the east a band of very high ground, continuous with the eastern line of northern Africa, runs from north to south, attaining its greatest average elevation in Abyssinia, and forming the most important highlands of all Africa. It is marked, towards the south, by the presence of a number of lakes of very large size, many of which occupy portions of two vast furrows also running mainly north and south and forming one of the most striking features in African geography. They seem to be due to gigantic cracks or rifts in the Earth's crust, which have resulted in two long lines of subsidence. Other evidences of subterranean disturbance are present in the form of old volcanic cones, some of which, Kilimanjaro, Kenya, and Ruwenzori, rise to heights of 17,000 to 19,000 feet, and are the highest summits of all Africa. From the floor of the western furrow rises a still partially active volcano (Kirunga), remarkable as occurring at a distance of nearly 700 miles from the sea.

Though narrower and lower to the south, this eastern line of highlands is continued in that direction to the extremity of the continent, forming near its southern end the Drakensberg Range with peaks of 10,000 and 11,000 feet. A line of high ground accompanies the western coast also, while the interior is filled by a plateau of somewhat lower elevation than the bounding ranges, so that the whole of South Africa bears a general resemblance to an inverted saucer.

Hydrography.—As the main lines of elevation run at no great distance from the coasts, Africa has no central backbone dividing the continent between eastward and westward flowing river systems. These may rather be distinguished as flowing down the outer or the inner slopes of the fringing highlands. Those which descend the outer slopes have of course comparatively short courses, while the inward-flowing streams have great distances to traverse before reaching the sea, and therefore form the great river systems of the continent. As a rule they pierce the mountain rim by narrow passages, during which their courses are much broken by cataracts. As a continental water-parting the eastern line of highlands plays the most important part, for from the north-east corner, where Africa joins Asia, through about 43° of latitude, it gives no passage to a river, but effectively separates the streams flowing to the Atlantic and Indian Oceans. In about 12° S., however, the water-parting diverges to the west, crossing the continent, and including within the basin of the Indian Ocean almost

the whole breadth of South Africa as far as 22° S., where it again strikes across to the east.

Owing to the position of this water-parting, the largest river systems are those which spring from its western rim, flowing west and north, and all belonging to the Atlantic basin. The two largest are those of the Nile—flowing from south to north but receiving its principal tributaries from the main watershed to the east—and Congo, describing a vast bend to the north and west and with its many important tributaries occupying the circular hollow of the ancient inland sea. The drainage system of the Niger, in the western limb of the continent, and therefore away from the main watershed, is still within the Atlantic basin. It also forms a vast curve, but the principal flow of its waters is towards the east and south, or exactly the reverse of that of the Congo. With the exception of the basin of the Orange in the south, the remaining Atlantic streams flow down the outer continental slopes. The principal are the Senegal, Gambia and Volta in the western limb, and the Ogowe, Kwanza and Kunene on the western side of the southern limb. West of the great water-parting, and therefore included within the Atlantic basin, there is a vast area of inland drainage consisting of the central basin of Lake Chad, fed principally by the Shari, and a still larger area in which any streams that exist are merely temporary.

On the side towards the Indian Ocean the only great river system is that of the Zambezi, enclosed within the westward curve of the main divide. The greater part of it is on the central plateau, while all the other streams flowing to the Indian Ocean—the Jub, Tana, Rufiji, Limpopo and others—flow mainly down the outer plateau slopes and have a greater or less importance according as these recede from or approach the sea.

Interpolated between the basins of the Atlantic and Indian Oceans, along the broad uplands which form the continental divide in East Africa, is a narrow region of inland drainage, the central furrow of which is formed by the more easterly of the great lines of subsidence already mentioned.

Geology.—The geology of Africa has not yet been fully investigated, and even where the formations have been studied to some extent it is often impossible to determine their age owing to the general scarcity of fossils. A broad distinction may be drawn between the Atlas range, with other parts of North Africa, and the rest of the continent, inasmuch as ancient crystalline rocks are almost entirely wanting in the former region, whilst elsewhere, and especially in the inter-tropical zone, there seems to be a foundation of Archæan rocks, which come to light especially along the axes of mountain ranges. These old rocks consist of granite and of gneiss in East Africa, and schists and other foliated rocks in West Africa. The chief sedimentary formations which have been found to overlie these ancient rocks throughout the greater part of Central and South Africa are of Palæozoic or early Mesozoic

age, the latter being particularly well represented in South Africa, where the Karroo beds (Triassic) occupy a large area. Jurassic and Cretaceous strata occur in parts of East Africa, and from the nature of its fauna it has been thought that Lake Tanganyika is the remnant of a Jurassic sea which stretched inland from the west. No Jurassic strata have, however, been found in the intervening area. Horizontally bedded sandstone, mostly of doubtful age, is common throughout Central Africa, while recent alluvium covers the centre of the Congo basin, and shifting sands much of the desert regions. In the East African highlands recent eruptive rocks have spread over immense areas.

While, therefore, the later Secondary and Tertiary formations seem to be but slightly developed in Central Africa, in the north they are well represented. In the Atlas, which forms, geologically, one of the best known parts of Africa, the Cretaceous system occupies the widest extent of the surface, in a series of beds comparable with those of Europe. It appears also as a horizontal deposit over a broad region bordering on the Atlas to the south and south-east, and a vast series of sandstones on the lower Nile (known as the Nubian sandstone), is supposed to be of the same age. Along the north-west coast, and in a few parts of the Atlas, Tertiary formations, chiefly Miocene, occur, but these attain their maximum development further east, the whole surface between the Gulf of Sidra and the Isthmus of Suez consisting of Tertiary rocks.

Climate.—The uniformity characteristic of Africa is less marked in the climate and productions, which necessarily differ according to latitude; but as the equator cuts the continent almost at the middle of its length, the climatic differences are much less extreme than in other continents. This central position of the equator results in a succession of climatic zones stretching across the continent, those of the north being reproduced in reverse order in the south. The primary cause of variation between the zones is of course the difference in the amount of heat received from the Sun. Both the northern and southern extremities are fairly temperate regions, that to the north being defined by the Atlas range, the lands north of which, climatically as in other respects, rather resemble southern Europe than the rest of Africa. Within the tropics the mean annual temperature varies within comparatively small limits, though there are differences in the distribution of temperature through the year. Near the equator, and especially in the coast-lands and western basin, the climate is generally equable, whilst elsewhere, especially in the elevated regions to the east, there is a much greater difference between summer and winter,

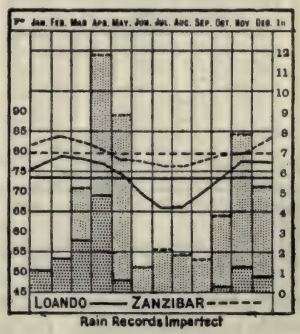

FIG. 433.—*Temperature and Rainfall of Tropical Africa.*

and between day and night. The absolute extreme of temperature does not occur on the equator but between the parallels of 10° and 20° N., where the average elevation is lower and the mass of land greater. Owing to the altitude of much of the land within the equatorial zone, the climate is often actually cool.

Far more important than differences of temperature is the variation in amount and seasonal distribution of rainfall. Bordering on the north and south temperate zones occur areas of minimum precipitation where desert conditions prevail. Owing to the form of the continent the northern desert zone, known as the Sahara, occupies an enormously greater area than the southern, forming, in fact, the largest continuous desert on the Earth's surface. The Sahara forms part of the great arid belt which stretches across the Old World from north-eastern Asia to the borders of the Atlantic Ocean. Virtually forming part of the greatest land-mass on the surface of the globe and thus little exposed to the moderating influence of the oceans, North Africa presents an example of an extreme continental climate, with great differences between the seasons. In winter it forms an area of high pressure and thus the winds blow outwards in all directions, while in summer, although the low pressure over the Sahara causes an indraught of air from its circumference, the intense heat constantly diminishes the relative humidity of these air currents, and they exercise a drying rather than a moistening influence. The southerly winds from the direction of the equator do, it is true, bring a certain amount of moisture, but the greater contrast in temperature between North Africa and the regions to the north causes the dry northerly winds to predominate. By its position at the northern edge of the continent the Atlas range does its part in screening the desert from the action of moisture-bearing winds, while the paucity of mountain ranges in the centre of North Africa is a further reason for the small precipitation. Where such exist, as, *e.g.*, in the countries of Air and Tibesti, local rains of some violence occur. Such rain-water soon sinks below the surface, often travelling immense distances before coming to light again as springs, and bringing fertility to isolated spots amid the barren wilderness, known as oases.

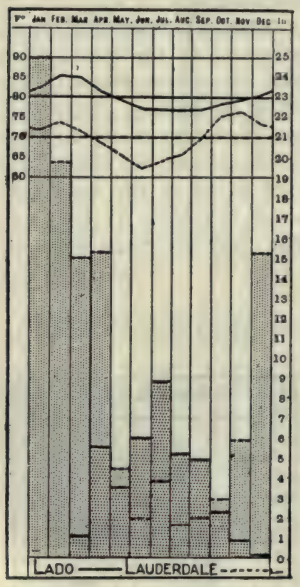

FIG. 434.—*Temperature and Rainfall of North and South Tropical Africa.*

Between the northern and southern desert regions the rainfall gradually

increases in the direction of the equator, in the neighbourhood of which the greatest rainfall occurs. But besides the variations of annual amount there is an important difference in different latitudes in the seasonal distribution of the rainfall. At a distance from the equator all the rain falls at one part of the year, the wet season commencing soon after the Sun becomes vertical, and lasting for two or three months, while the rest of the year is dry. But as we approach the equator, since the Sun is vertical twice in the year, there are two rainy seasons separated by an interval of dry weather, while near the equator itself rain falls more or less throughout the year. Local differences of rainfall, apart from the influence of latitude, of course occur, certain mountainous regions being especially rainy, while tropical West Africa, on the borders of the Gulf of Guinea and in the basin of the Congo, has a larger rainfall than the eastern part of the continent between the same latitudes.

Flora.—The varying climatic conditions naturally exercise a most important influence on the vegetation, and through it on the animal life of the continent. The northern temperate region has a flora similar on the whole to that of southern Europe, the forests consisting largely of oaks, while the olive, vine, fig, as well as the cereals of Europe, thrive. Owing to its isolation the southern temperate region has a strongly marked flora of its own, characterised especially by the general brilliancy of its flowering plants and the abundance and variety of heaths. Forests are not extensive, but much of the surface supplies fodder for cattle and sheep. The desert regions, as their name implies, are in many parts—especially where the sand is piled up by the action of the wind into dunes—almost entirely devoid of vegetation, and that which exists is stunted and thorny, being differentiated so as to be specially adapted to the dry climate. One of the most common bushes is the gum acacia. As a rule plants grow in tufts with bare spaces between instead of forming a complete covering of the surface. In the oases the date-palm, the characteristic tree of the Sahara, forms dense groves. On the margin of the desert, proceeding in the direction of the equator, the vegetation increases and a steppe-like region ensues, still largely characterised by thorny acacias, while another palm, the Dum or *Hyphæne*, makes its appearance. The moister regions of Central Africa fall broadly into two main divisions, the forest and savanna. Where an abundant and evenly distributed rainfall is com-

FIG. 435.—*Vegetation of Africa.*

bined with an equable temperature a luxuriant forest growth is developed, such being the case generally in the whole of the tropical coasts of West Africa together with the lower parts of the Congo basin. Forests also occur on the east coast and generally on the slopes of mountains exposed to moist winds from the sea. The whole of the remainder of tropical Africa forms the region of savannas, remarkably uniform in character, and extending from the Senegal in the north-west to Abyssinia in the north-east, and thence through East Africa round the western forest region until it reaches the west coast again south of the Congo. Trees are usually found along the courses of streams, where they form what are known as "gallery forests," and are often dotted over the surface in groups, giving it a park-like appearance.

The savanna regions are characterised especially by the occurrence of the massive Baobab tree (*Adansonia digitata*), and in the drier parts by the curious candelabra-like Euphorbia. An immense variety of trees is found in the western forest region, which is the special home of the wine and oil palms (*Raphia vinifera* and *Elæis guineensis*). A special flora occurs on many of the higher African mountains, which present a succession of zones of vegetation varying with the altitude. Bamboos form regular thickets above the true forest zone, whilst higher still occurs a peculiar type of vegetation consisting largely of tree lobelias and a giant species of Senecio. Lastly, a type of vegetation deserving mention is that growing by the swampy margins of streams especially in the upper Nile and Congo basins; it is marked by the luxuriant growth of papyrus and other aquatic plants.

Fauna.—The distribution of animal life upon the continent follows very closely the broad subdivisions of the flora. The desert regions, however, apart from the negative characteristic of scarcity of animals, are less individualised in this respect, forming rather areas of transition between the regions on either side of them. The main dividing line of the continent has, in fact, been drawn across the centre of the Sahara at the Tropic of Cancer; all to the south of this line makes up what is known as the Ethiopian Region, while the smaller area to the north has more in common with the countries north of the Mediterranean. Especially characteristic of the Ethiopian Region is the abundance of ungulates and carnivorous animals, the former including two families, the hippopotami and giraffes, found nowhere else in the world. But the family best represented is that of the antelopes, which occur in extraordinary numbers, while the deer are almost entirely wanting. Four species of rhinoceros represent a group common to Africa and south-eastern Asia. The carnivores include the lion, leopard, several hyænas, the jackal, and a large number of civets and their allies, but the tiger, fox and wolf are wanting. The African elephant was formerly found throughout nearly the whole of the Ethiopian Region, but its range is now much restricted owing to the persecution it has met with for the sake of its ivory.

cattle-rearing is little practised. Yet certain tribes of the savanna region, notably the Zulus and Kaffirs of the south-east, as well as the Dinkas and others of the Upper Nile, practise it extensively in conjunction with agriculture. The Hottentots, who inhabit the arid region of the south-west, are again pre-eminently pastoral, while the Bushmen and other tribes of small stature live chiefly by hunting.

The peoples of Africa are alike remarkable for the small amount of political cohesion they exhibit, the few States of any importance which have arisen since the time of the ancient Egyptians having been almost entirely the result of external influence. The nomadic pastoral races of the north dwell under the patriarchal rule universally associated with that mode of life. Where agriculture can be practised, as in Abyssinia, political organisation has proceeded further. The Negroes, on the other hand, though agriculturists, show a marked incapacity for the establishment of stable kingdoms, being split up into a great number of independent tribes, ruled by petty chiefs, whose authority often extends over a few villages only, and who live at constant feud with each other. The universal prevalence of polygamy, leading to intrigue among the families of the chiefs, has tended to perpetuate this state of things, and still more the slave trade, which has been the scourge of Africa for centuries, and which encourages inter-tribal warfare for the supply of prisoners. The religion of the Negroes is a compound of degrading superstitions, fetishism being widely diffused, and this has done much to keep the race in a backward state. Except in Abyssinia, where a debased form of Christianity prevails, the Hamites and Semites are all adherents of Islam, which since its introduction by the Arab invaders, has exercised a certain civilising influence, and the few native States of any importance—on the Mediterranean coast and among the mixed races south of the Sahara—may be ascribed to its agency. At the present day the southward advance of Islam among the Negroes has an important bearing on the future of the continent.

History.—Although North Africa, from its contiguity to the Mediterranean, has from the earliest times participated in the life of the world at large, the bulk of the continent, shut off on the north by the great Saharan desert, and placed at a disadvantage on other sides by its massive form, its want of navigable waterways, and its unhealthy coastlands which have seen the rise of no powerful kingdoms and offered few inducements to commercial activity, has, apart from a certain amount of intercourse between its east coast and the south-west of Asia, remained entirely outside the pale of civilisation. Such isolated episodes as the supposed journey of the Nasamonian youths across the Sahara and the circumnavigation by the Phœnicians (related by Herodotus), or the voyage of Hanno, the Carthaginian, down the west coast, did but momentarily lift the veil of obscurity, and though during the Roman epoch some light reached Europe through the travels of merchants, the Nile expeditions initiated by Nero,

and the geographical investigations of Ptolemy of Alexandria, the Saracen conquest of North Africa in the seventh and following centuries cut off the rest of the continent from all intercourse with Europe, and for several centuries the only additions to knowledge were supplied by the writings of Arab historians, who left some record of the kingdoms founded by Arab influence to the south of the Sahara. A new era dawned when, early in the fifteenth century, Prince Henry of Portugal devoted himself to the discovery of a sea route to the east round the African coasts, for his untiring efforts, carried forward after his death by others, led to the rounding of the Cape of Good Hope by Bartholomew Diaz in 1488, and the successful voyage to India of Vasco da Gama in 1497–98. In course of time Portuguese settlements were formed both on the east and west coasts, and when other European nations entered the field trading stations were established by them on the coasts of Guinea and elsewhere, while in 1652 the Dutch occupied the site of Cape Town. At the opposite end of the continent the Turks had established themselves along the Mediterranean shores in the previous century. During the most flourishing days of their rule the Portuguese penetrated some distance into the interior, especially in Abyssinia, but it is uncertain how far their knowledge extended. On the Senegal and Gambia, French and British adventurers attempted, without much success, to penetrate to the mysterious city of Timbuktu.

The systematic exploration of the interior has, however, been almost entirely the work of the past century. Between 1768 and 1772 James Bruce made his celebrated journey to the source of the Blue Nile, but the founding of the "African Association" in 1788 was the event from which the modern period of exploration must be dated. The discovery of the course and termination of the Niger—due chiefly to the journeys of Mungo Park (1795–1805) and Lander (1830)—and the exploration of parts of the Sahara and Sudan, with the discovery of Lake Chad—the work of Denham and Clapperton (1822–27)—were the earliest fruits of the interest thus aroused. The journeys of Laing (1825) and Caillié (1828) to Timbuktu also deserve mention. In South-East Africa the Portuguese scientific explorer, J. de Lacerda, made an important journey in 1798. In South Africa, where the Dutch settlement finally passed into British hands in 1806, some progress was also made, especially by the journeys of Dr. Andrew Smith and Captain J. E. Alexander. The conquest of Algeria by France in 1830, and of the Eastern Sudan by Mehemet Ali of Egypt in 1820–21, paved the way for an advance in these directions, and an Egyptian Expedition ascended the Nile as far as 4° 42′ N. in 1841.

A period of renewed activity began in 1849, in which year Dr. Livingstone made his first exploring journey from the south, discovering Lake Ngami, while reports of snowy mountains in East Africa came from the missionaries Krapf and Rebmann, and preparations were made for a British Government expedition from the north to the central Sudan. Important

results followed in all three directions. Dr. Livingstone reached the Zambezi, made his way to the Portuguese colony of Angola, and returned across the continent to the mouth of the Zambezi (1851–56), while other travellers, including Galton, Baines, and Mauch, filled in the details of the country south of that river. In East Africa an expedition despatched by the Royal Geographical Society, under Burton and Speke, reached Lake Tanganyika and the Victoria Nyanza (1858); while Speke, returning with Grant in 1859, further explored the Victoria Nyanza, and discovered its outlet towards the Nile, thus virtually solving the problem of the Nile sources. In 1864 Baker discovered the second Nile reservoir in the Albert Nyanza. In North Africa the expedition, led at the outset by Dr. Richardson and afterwards by Dr. Barth, traversed the central Sudan in various directions, and threw a flood of light on its imperfectly known geography. Good work was also done later by Rohlfs and Nachtigal.

The exploration of the great Congo basin, so far a blank on the maps, was ushered in by Dr. Livingstone's last great journey (1866–73). Proceeding by way of Lake Nyasa (discovered by him and Sir John Kirk in 1858) he came upon a vast northward flowing river system, which he at first considered to belong to the Nile basin, but which still retained its secret when death overtook him on the shores of Lake Bangweolo. Cameron threw additional light on this river system by his journey of 1873–76, during which he discovered the outlet of Lake Tanganyika, but the solution of the problem was supplied by H. M. Stanley, who, after important exploration in East Africa, turned his steps westward and amid incomparable difficulties and dangers traced the great Lualaba to its termination as the Congo in the Atlantic Ocean. An important journey into the Congo basin from the north had been made in 1869–71 by Dr. Schweinfurth, and about the same time Egyptian sovereignty was extended to the Albert Nyanza.

The largest share of African exploration had so far fallen to British subjects, but the interest of Europe was now thoroughly awakened and explorers of all nationalities flocked to the shores of the continent. Political activity was also aroused. A vast undertaking, initiated by King Leopold of Belgium, finally led to the formation of an Independent State of the Congo, whose many branches have since been explored by the State officials. France, likewise, pushed into the interior from Algeria and her settlements on the Senegal and Gabun, in time extending her influence over the greater part of the western Sudan, and even to Lake Chad and the Nile watershed. In 1882 Great Britain acquired a preponderating influence in Egypt by the suppression of the military revolt under Arabi Pasha. In 1884 Germany obtained a footing in South-West Africa, in Upper Guinea (Togoland), and the Cameroons (Kamerun), and soon afterwards in East Africa, where in 1886 and 1890 the most fertile portions were partitioned between that country and the United Kingdom. Before

this the journeys of Joseph Thomson had much enlarged the bounds of our knowledge in East Africa, especially in the country of the dreaded Masai tribe.

In 1884 a British protectorate was declared over the lower Niger, and British influence is now recognised in this region as far as Lake Chad. The extension of the older colonies of the Guinea coast has, however, been much hampered by the French expansion. In South Africa the bounds of British territory have been pushed far to the north, reaching beyond the Zambezi and joining hands with another young settlement on Lake Nyasa. In the Nile basin civilisation received a severe check by the Mahdist revolt of 1883, and not till 1898 was the eastern Sudan once more liberated by the Anglo-Egyptian campaign under Lord Kitchener. Italy gained a footing on the Red Sea in 1882 and subsequent years, and afterwards on the Somali coast south of Cape Guardafui. Her attempts to establish a protectorate over Abyssinia have, however, proved unsuccessful. Portugal has obtained some extension of her old colonies on the east and west coasts, but has failed to realise her dream of uniting them across the continent. These territorial acquisitions first received international recognition at the Berlin Conference of 1884; and subsequent agreements between individual Powers, have brought practically the whole continent under European influence. Important agreements concluded in 1890–91 between the United Kingdom and Germany, France, Italy and Portugal determined the broad outlines of the partition of the interior, but left many points open to dispute, especially between the United Kingdom and France. These were finally settled by the Niger Convention of 1898 between those countries, and by the supplementary Declaration of 1899. France has thereby made good her claim to a continuous territory extending from the lower Congo round the eastern shores of Lake Chad to Algeria in the north and the Senegal in the north-west; and the United Kingdom has established political ascendancy over the whole upper Nile basin. Explorers have more and more worked from political motives, confining their attention chiefly to the spheres of their respective countries. Among the host of names deserving credit for the filling in of details in the map of Africa since Stanley's great journey of 1874–77, those of Thomson, Teleki, and Baumann (East Africa), Wissmann and Grenfell (Congo basin), Binger and Monteil (West Sudan), Foureau (Sahara), and

FIG. 437.—*The Railways and Telegraphs of Africa* (1907).

Bottego (Galla and Somali-lands), stand out pre-eminent for the value of their achievements.

With the increase of exploration efforts have been made to open up the comparatively healthy plateaux by railways from the coast; the penetration is greatest from Cape Town in the south and Cairo in the north, and it is hoped that these systems may be united in the not distant future. Apart from the submarine cables, which form loops round the coast, overland lines have been carried into the interior in advance of the railways; the wire from Cape Town will soon be open along Lakes Nyasa and Tanganyika to Uganda and ultimately to Cairo, while a line is being constructed from Leopoldville on the Congo to Lake Tanganyika.

POLITICAL DIVISION OF AFRICA.

APPROXIMATE AREAS.

	Sq. miles.
European Colonies and Protectorates:—	
French territory[1]	3,712,000
British territory[2]	2,165,000
Egypt (with Sudan to 5° N.)[3]	1,135,000
Congo State (Belgian influence)	905,000
German territory	905,000
Portuguese territory	794,000
Tripoli with Fezzan (Turkish)	340,000
Italian territory	230,000
Spanish territory	82,000
Native States outside European influence:—	
Abyssinia	320,000
Marocco	180,000
Liberia	52,000
Unclaimed (Eastern Sahara)	630,000
Larger lakes	70,000
Total	11,520,000

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1 Including Wadai and a large area of the Sahara still unoccupied
2 British East Africa is considered to extend to 5° N.
3 Under Turkish suzerainty, administered by Great Britain.

CHAPTER XLIX.—NORTH AFRICA

I.—MAROCCO

By Lieut.-Col. Sir R. Lambert Playfair.

Position and Extent.—The Empire of Marocco (often written Morocco) extends on the north from Cape Spartel, a distance of 300 miles, to the frontier of Algeria. The boundary between them, fixed by treaty in 1845, starts from the river Kiss and runs in a south-easterly direction to a little beyond the 33rd parallel of latitude. On the Atlantic coast the Empire extends for a distance of 450 miles, as far as the Wad Draa.

Condition and History.—Marocco is the last of the Barbary States which has preserved its independence, and it is peculiarly interesting from the fact of its standing alone as a monument of barbarism. The Sallee rovers, it is true, no longer scour the seas as of yore, but the inhabitants of the Riff country, who have given the word Ruffian to the English language, are as much pirates at heart as ever, and they lose no chance of plundering any vessel which may happen to come too near their inhospitable shore. There is no country near Europe so little known. Up to 1820 the largest share of the information we had of it was derived from the narratives of Christian captives, or of the envoys sent to effect their ransom. Its geography and natural history have more recently been illustrated by many eminent travellers.

Configuration and Rivers.—The configuration of the Atlas and the hydrographical system of the country are not essentially different from those of Algeria, but, inasmuch as the mountains are higher and in some places covered with perpetual snow, the rivers on both sides of the range are more considerable. The exact height of the loftiest peak is not known, but Joseph Thomson ascended one in the southern Atlas 12,700 feet, and another 13,000 feet above the level of the sea.

Marocco has no navigable rivers, but some could be made so if the sandbanks at their mouths were removed. The only considerable one on the Mediterranean coast is the Muluia, the ancient Molocath, which has a course of 400 miles. Those on the Atlantic coast are the Kus, the Sebu, the Bou Ragreg, the Um-er-Rebia, the Tinsift, the Sus, and the Draa. In summer they are half dry, but in winter they are raging torrents.

Productions and Communications.—Some of the plains and valleys are of great fertility; cereals are grown abundantly, though cultivated in the most rudimentary manner. Dates, olives, figs and many other fruits are plentiful. Marocco, as a rule, is a treeless country; the northern slopes of the Atlas contain finely wooded valleys, but beyond this little remains of the natural forests which at one time covered western Barbary. There are rich mineral deposits in the Atlas, quite unworked. The roads

throughout the country are mere bridle-paths worn by travellers, beasts of burden, cattle, sheep and goats throughout uncounted ages. No railways exist in the empire.

People and Government.—The population of Marocco does not probably exceed four millions and has nearly the same composition as in Algeria, except for the lack of the European element. Marocco has been called a crumbling empire ; it is governed by an absolute Sultan, and a turbulent aristocracy, but from a religious point of view it is the last stronghold of Islamism. The only resources of the treasury are exactions and authorised robbery from one end of the social scale to the other. The trade is insignificant compared with the size of the country. Farm produce and manufactured leather are exported, and textiles imported. The United Kingdom stands first in the share it takes both in the export and the import trade.

Towns.—The three capitals where the Sultan resides alternately are

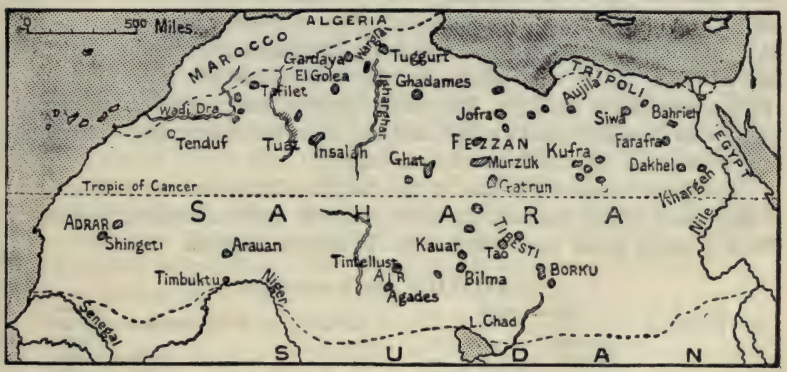

FIG. 438.—*The Oases of the Sahara.*

Fez (*Fas*), *Mekenes*, and *Merakish* or Marocco city. The towns on the coast, commencing from the Algerian frontier, are *Tetuan*, *Tangier*, *Laraich* (*El-Araish*), *Sallee* (*S'la*), *Rabat*, *Casa-Blanca* or *Dar-el-Beida*, *Mazagan*, *Safi*, and *Mogador* or *Sueira*. These have a varnish of civilisation, but in the interior, though not without relics of past splendour, the towns are masses of ruin and all-abiding filth. The most important, naturally, is *Tangier*, where the diplomatic agents of foreign Powers reside. It is of peculiar interest to Englishmen as it formed part of the dowry of Catherine of Braganza on her marriage with Charles II. in 1662. After a short and badly managed British occupation, it was evacuated in 1683. It is now a favourite residence for winter visitors.

Saharan Oases.—All along the Saharan slopes of the Atlas there are oases inhabited by more or less independent tribes owning the suzerainty of the Sultan. The most important is that of *Tafilet* or Tafilelt,

about 200 miles east of Merakish. This remarkable place has been visited recently by Mr. Harris, who went from Merakish, crossing the Atlas range, through a district inhabited by Berbers, every part of which is dominated by great castles, often 50 feet high, with richly decorated towers. Tafilet consists of a strip of fertile land, growing vast quantities of dates, extending along the parallel beds of the Wad Ziz and the Wad Gheris, rivers which irrigate 400 square miles before being lost in the sand. There is no city of the name of Tafilet; the capital of the district was Sigilmassa, so familiar to readers of mediæval works on Marocco, now a complete ruin. Here is the resting-place of Mulai Ali Sherif, the ancestor of the reigning Sultan, whose tomb is held in great veneration.

About 100 miles to the east is the Wad Ghir, the upper part of which was seen by the French soldiers of General Wimpffen's expedition in 1870, who compared it, in volume, to their own Meuse. After receiving the waters of the Zusfana at Ighli, the united stream flows southward under the name of the Wad Messaud, and eventually becomes lost in the basin of El-Erg. This is geologically the most extraordinary part of the Sahara; it is an immense tract of sand, seemingly impassable for man or beast, but nevertheless there are valleys in which caravans are able to journey with comparative facility. The basin between the two rivers is exceedingly rich in subterranean water, and the wells there are capable of irrigating as many as eight millions of date-palms.

The other oases of this part of the Sahara—Tuat, Gurara, Tidikelt, and Figig—over which Marocco formerly claimed some authority, have lately been brought under the control of the French in Algeria.

STATISTICS (*rough estimates*).

Area of Marocco in square miles	219,000
Population of Marocco	estimates vary from 3,000,000 to 9,000,000
„ Merakish	„ 60,000
„ Tangier	„ 25,000 to 30,000
„ Fez	„ 24,000 to 140,000

ANNUAL TRADE (*in pounds sterling*).

Exports	1,400,000
Imports	1,500,000

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II.—ALGERIA

By Lieut.-Col. Sir R. Lambert Playfair.
British Consul-General in Algeria.

Extent and Configuration.—The French colony of Algeria, bounded on the west by Marocco, is comprised between 2½° W. and 8½° E. longitude. Southward, the colony proper reaches to about 32° N. latitude, but

beyond this the Saharan districts under military rule stretch to about 26°. Apart from these, the area is calculated at about 184,000 square miles.

Politically it is divided into three departments. Oran, which occupies the western part, contiguous to Marocco. Algiers, the central and most important department, which, owing to its closer relations with the countries on the northern shores of the Mediterranean, is the centre of European commerce and colonisation. The third is Constantine, which forms the eastern part next to Tunisia. The natural divisions of the country also are three : the Tell, the High Plateaux, and the Sahara ; but the political divisions bear no relation to them.

The Tell is a strip of undulating, cultivated land, extending 50 to 150 miles inland from the sea, and forming the northern limb of the Atlas. This range, covered with splendid forests, containing fertile valleys, and in some places arid steppes, stretches eastward from the ocean to which it has given its name, through Marocco, Algeria and Tunisia, becoming interrupted in Tripoli and ending in the beautiful green hills of Cyrenaica. The best known part of this mountain range is the district called Kabylia, inhabited by a branch of the Berber race, who, unlike the Arabs, build stone houses, and cultivate their land with the care usually bestowed on market gardens. A less known but even more interesting region is the Aurès range, overhanging the Sahara, enclosing fertile plains and valleys of great richness. These mountains are the highest in Algeria : Shellia has an altitude of 7,611 feet and Mahmel is nearly as high. Another mass, within the Tunisian frontier, is the wild and beautiful country of the Khomair, with great stretches of oak forests interspersed with glades of cleared and cultivated land.

The region of the High Plateaux, extending from west to east, consists of vast plains separated by parallel ranges of mountains. These terraces increase in height as they recede from the Tell, and again decrease as they approach the Sahara. Cultivation is only possible, within narrow limits, in localities capable of irrigation. It is covered with alfa grass and abundance of delicate aromatic herbs well suited for rearing sheep and goats.

The Sahara consists of two very distinct regions which may be called the Lower and Upper Sahara. The Lower Sahara is a vast depression of sand and clay, stretching eastwards as far as Tunisia ; the Upper Sahara is a rocky plateau frequently attaining a considerable elevation, extending on the west into Marocco. Moving sand occupies an extensive zone in both regions, but it does not cover one-third of the whole surface. The oases, or gardens of date-trees (Fig. 438), with which the Sahara is studded, exist wherever water is found ; that only is necessary to make the desert sand excessively fecund.

Geology and Minerals.—Space does not admit of full treatment of the geology proper of Algeria ; but some notice is necessary of the economic minerals. The ores of various metals are found in great abundance : lead ore, more or less argentiferous ; copper, blende, calamine, antimony, chrome,

manganese and iron. Iron ore is the most important, and generally occurs so near the surface that it can be worked in open quarries; nearly half a million tons are exported every year, principally from Beni Saf, near the frontier of Marocco. Algeria is especially rich in decorative stones—marble, breccia and oriental alabaster, some of which is probably the finest that the world contains. It is worked near Kleber in Oran, and also at Ain Smara, near Constantine. Phosphate of lime of excellent quality and apparently inexhaustible quantity has recently been discovered at Tebessa and in the south of Tunisia, and the industry has been developed by the energy and intelligence of British subjects, rousing much adverse comment from French and Algerian politicians, who hold that foreigners should not be permitted to develop the industries of the country.

Hydrographic System.—The drainage area of the Tell is as regular as in other countries and its streams all reach the sea. The most considerable are the Mafrag, the Seybus, the Wed-el-Kebir, the Makta, and the Shelif, which, during flood-time, discolour the water for several miles at sea, but have not the strength in summer to force a passage for themselves through the banks of sand accumulated in their estuaries. With the streams descending from the southern slopes of the mountains, however, it is quite different. Some part of their waters is absorbed by irrigation in summer, but after the copious rains of winter they reach the Sahara, where they either form large open lakes called shotts, which, owing to evaporation, become salter than the ocean, or they sink through the permeable stratum of sand till they come to an impermeable one of clay, and thus form a vast subterranean reservoir. From time immemorial artesian wells have been sunk in this district, and their waters have everywhere spread life and wealth. The French have done a splendid and beneficent work in multiplying these wells wherever there was a prospect of success. Between 1856 and 1890 no less than 794 were sunk. In one part of the Sahara, the Suf, this water circulates close to the surface of the soil, concealed by a bed of sulphate of lime. One has only to penetrate this layer of gypsum to create a well. When it is intended to plant a date grove the Suafa remove the entire crust and plant their palms in the water-bearing sand below.

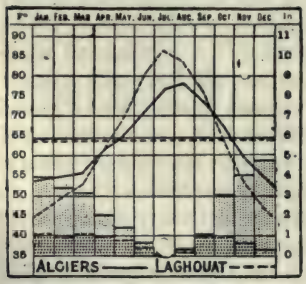

FIG. 439.—*Temperature and Rainfall on the Coast and in the Interior of Algeria.*

Climate.—The climate of Algeria, for winter visitors at least, is certainly the finest in the Mediterranean, though not without a due proportion of wet and cold. The summer is rainless and extremely hot. From an agricultural point of view the seasons are too variable: sometimes it is too cold, and the tender crops are killed by

frost, or it is too hot and a blast of the sirocco destroys the produce of a vineyard in a few hours. On the coast frost and snow are exceedingly rare, but on the High Plateaux and on the most elevated parts of the Tell the frost is sometimes severe and snow lies long and deep; the highest peaks of the Atlas retain some snow as late as June. The extremes of climate increase towards the arid Sahara.

Flora and Fauna.—The flora and fauna of the eastern portion of Algeria do not differ essentially from those of Sicily and Sardinia, while on the west they resemble rather those of Spain. Of the 3,000 plants found in Algeria, by far the greater number are natives of southern Europe, and less than 100 are peculiar to the Sahara, where Africa may be said to begin. Absolutely the same may be said of the fauna. There are many mammals, fish, reptiles and insects common to both sides of the Mediterranean. The fish of the Tell and High Plateaux belong exclusively to the European system. Algeria possesses twenty-one species of fresh-water fish, of which five are peculiar to itself. The Sahara alone is linked to the African system by its Chromidæ, which occur all over Africa as far as Moçambique. It is by no means uncommon for fish to be ejected by artesian wells; as they are not blind, it is concluded that they inhabit the subterranean reservoir or sea, which occupies the bottom of the Saharan depression, and that they circulate between one open space and another.

Natural Productions.—Algeria is essentially an agricultural country, and it is from its soil, in a great measure, that its riches and importance proceed. Owing, however, to the uncertainty of its seasons, periodical drought and increasing competition with more favoured regions, the cultivation of cereals is yearly becoming less remunerative, although the quantity produced has increased, and the area producing it has risen from five and a half to seven million acres in twenty years. Algeria is rapidly becoming one of the principal wine-producing countries of the world. The vine prospers everywhere, even on the worst land and in the driest years. Everywhere, but especially on the littoral, excellent wine is produced, of infinite variety. All that is not consumed in the country is exported to France. One of the most important of the vegetable resources is the Alfa fibre, properly called Hulfa, or Esparto grass. This grows spontaneously over vast tracts of country where cultivation of any kind is impossible. Ten million acres are covered with it, yielding paper-making material equal to three-fourths of all the rags used throughout the world. The amount exported, however, continues steadily to decrease, owing to the increasing use of wood pulp. The surface of forest land is about seven and a half million acres; and Algeria thus occupies the sixth rank amongst the forest countries of Europe. The principal trees are cork-oak, several other kinds of Quercus, Aleppo and maritime pines, and the Atlantic cedar (*Pinsapo Thuya*), which yielded the far-famed Citrus wood of the ancients. The most attractive forests are those of cedar, a never-ceasing source of pleasure to the

traveller, but hitherto they have proved of no very great commercial importance. The cork forests have an area greater than those of Spain, though not quite equal to those of Portugal, and much less productive.

People and Language.—Numerically the most important class of the native population are the Arabs, who date back to the Arab occupation of the country in the twelfth century ; they took possession of the most accessible districts and drove the original owners, the Berbers, into their mountain fastnesses. They are essentially a nomad race, living in tents which they change from place to place as the pasturage around them is consumed. The term Moors, at the present day, is one of European invention, and is generally applied to Arabs who live in fixed habitations. The Arabs who reside within the sphere of French influence have acquired a certain varnish of civilisation, but the great mass of the population are now as they were in the days of Ishmael, and such are they likely to continue for generations. The Berbers constitute a division of the great aboriginal race which inhabited North Africa as far as the Red Sea. They live in the more inaccessible mountain regions. The chief branches are the Kabyles of Jurjura, numbering about 200,000, and the Shauia of the Aurès, whose name is derived from the Semitic root Sha, a sheep ; they have few or no cattle, but immense flocks of sheep and goats. The Jews are said to have established themselves in Algeria after the destruction of Jerusalem by Titus, but it is more probable that they did so after their expulsion from the various parts of Europe in the fourteenth and fifteenth centuries. The native languages are a more or less corrupt form of Arabic, spoken by Arabs and Jews, and Berber by the Kabyles, Shauia and other mountain races. Berber is the speech of over two-thirds of Marocco, and may be traced everywhere in the Sahara almost as far as Senegal. It has no written character, and all the "literature" it possesses is transmitted orally. The Shauia dialect is full of Latin words, and in their daily life the people retain customs undoubtedly derived from the admixture of Latin races in their ancestry. They use the solar instead of the lunar year, and their names for the months are hardly different from those in use in Europe.

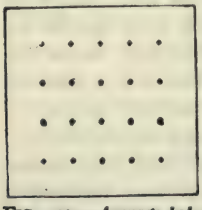

FIG. 440.—*Average population of a square mile of Algeria.*

Government.—When the French army, by a bold stroke, took possession of Algiers in 1830, France was as much surprised as the rest of the world. The expedition was sent to avenge an insult, and no one contemplated the creation of a magnificent colony. The first part of the modern history of Algeria was purely military, but as security began to be established, European colonisation followed rapidly. The government of the colony has undergone a complete transformation of late years. Formerly the Governor-General united in his person the chief civil and military authority. Now an entirely civil *régime* has been introduced. Each of the

three departments is governed by a prefect as in France, but under the supreme authority of the Governor-General, who is assisted by a Council of Government; there is also a superior Council to which delegates are sent by each of the Departmental Councils. Each of the three departments sends one Senator and two Representatives to the Parliament in Paris.

The military forces consist of the 19th Army Corps of France; a portion of territory in the extreme south is still under the government of the commander-in-chief of this corps.

Industries and Trade.—Algeria can hardly be said to be a manufacturing country. A few objects, such as carpets, blankets and pottery, are produced by the Arabs, principally for their own use, but these are much sought after by European residents and visitors. The breeding of sheep is one of the principal employments of the native population on the High Plateaux. Although there is abundant pasturage for a larger number, it is impossible greatly to increase the stock owing to the scarcity of water during summer.

The external trade of Algeria is almost entirely with France, all other countries together only participating to the extent of 10 per cent. of the total. The chief exports are cereals, esparto grass, tobacco, iron-ore, wine, and cork; the chief imports are manufactured articles, coal and coffee.

Algiers is an important coaling station for vessels trading in the Mediterranean, and its value in this respect is increasing.

Communications.—The railway system has made rapid progress of late years. The aim of the administration is to have a central line from Tunis to Marocco, passing through the most important points in the interior, and various subsidiary lines joining this with the sea. This has been almost completely carried out. The roads are magnificent, such as no nation but the French seem able to construct, and they are nearly three times the length of the railways.

Towns.—Commencing from the frontier of Marocco, the towns along the coast are, *Nemours*, *Oran*, the capital of the province, with an excellent harbour, *Arzeu*, *Mostaganem*, *Ténèz*, and *Cherchel*. *Algiers* is the capital of the central province and of the entire colony. The modern town consists of regular streets and squares, fine public buildings and excellent hotels. The old town, inhabited chiefly by Arabs, lies on the steep hill behind the modern one, in the form of an irregular triangle, the apex of which is the old Turkish kasba or fortress. The streets are narrow, tortuous and irregular, joined together by alleys, in some of which it is barely possible for two men to pass. One of the principal features of these old Arab houses is that, rising as they do, one above the other, and covered with flat terraced roofs, a magnificent view is obtained from them of the city, the harbour and the distant mountains. Under the Turkish government the roofs were reserved for the women alone, who used to visit each other by climbing over the low parapet which divided the houses. The inner harbour of Algiers was originally constructed by Kheir-ed-din

in 1518, by connecting the island on which the Spanish lighthouse stood, and still stands, with the mainland by a causeway. The present harbour is French; it is interesting as the first ever constructed with blocks of concrete. The environs, especially *Mustapha Superieur* and *El-Biar*, are covered with beautiful villas and splendid hotels, greatly frequented by English and other visitors in the winter season.

To the east of Algiers are the towns of *Delys; Bougie*, with a fine natural harbour, situated amidst magnificent mountain scenery; *Djidjelly; Collo; Philippeville*, one of the ports of Constantine, with a splendid artificial harbour; *Bône*, the ancient Hippo Regius, the home of St. Augustine, also possessing a fine harbour. Both the last have railway communication with Constantine; and lastly, *La Calle*, a town of considerable interest, as it was here that the French first established themselves in 1520.

The towns in the interior, again commencing from the west, are *Tlemçen*, the Roman *Pomaria*, a place not unlike and at one time hardly less celebrated than Granada, or inferior to it in beauty of situation or architectural interest. Next come *Sidi Bel Abbès; Mascara*, with its memories of Abd-el-Kadir; *Tiaret; Orleansville*, on the line of railway from Oran to Algiers; *Miliana; Blida; Setif*, on the High Plateaux, and *Constantine*, the "Lordly Cirta," always an important natural fortress, where Syphax and Masinissa reigned, where Sophonisba died by her own hand, where St. Cyprian was exiled, and the scene of the two most important operations of the many undertaken by the French armies. In point of scenic beauty and grandeur, probably no town in the basin of the Mediterranean can equal it. South of it, on the border of the desert, is *Biskra*, now becoming very popular as a winter station; it is practically rainless, but it has not the beautiful scenery and the amenities of life which make Algiers so pleasant.

The most prominent fact that meets one at every turn is that France has been transported to Africa; the whole country is covered with French towns and villages, and foreigners are held in disfavour, although the foreign element has played a most important part in the colonisation of the country, and even now, if the Spanish, Italian and Maltese elements were eliminated, work would be at a standstill. Another fact that strikes the stranger is the permanence and solidity that pervades everything. The railways are constructed as well and expensively as in France, the roads are unsurpassed in any country, and the hydraulic and irrigation works are splendid in their conception.

STATISTICS.

	1886.	1896.	1901.
Area of Algeria (square miles)	184,474 ..	184,474 ..	184,474
Population	3,817,306 ..	4,429,421 ..	4,739,331
Density of population per square mile..	21 ..	24 ..	26
		(1891)	
Population of Algiers	74,792 ..	82,585 ..	96,542
„ Oran	67,681 ..	74,510 ..	87,801
„ Constantine	44,960 ..	46,581 ..	41,138
„ Bône	29,640 ..	30,806 ..	32,288
„ Tlemçen	28,204 ..	29,544 ..	22,273

COMPOSITION OF POPULATION OF ALGERIA.

Races.	1886.		1891.
French	219,627	..	271,101
Jews	42,595	..	47,564
Algerian and Tunisian Mohammedans	3,269,376	..	3,554,067
Maroccans	17,445	..	18,617
European Foreigners	203,153	..	218,201
Total	3,805,684	..	4,109,650

ANNUAL TRADE OF ALGERIA (*in pounds sterling*).

	1871-75.		1881-85.		1891-95.
Exports	5,800,000	..	5,900,000	..	10,200,000
Imports	7,800,000	..	12,400,000	..	9,200,000

STANDARD BOOKS.

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III.—TUNISIA

By Sir Harry H. Johnston, G.C.M.G., K.C.B.,

At one time British Consul-General at Tunis.

Position and Surface.—Tunisia, the ancient Roman province of Africa (still called "Ifrigiah" by the natives), is the most northerly projection of the Dark Continent. It is the most easterly prolongation of true North Africa—that is to say, of all the temperate, fairly well-watered regions north of the Sahara desert.[1] Tunisia is divided into four fairly distinct regions—Tell, Sahel, high Tablelands, and Sahara (desert). The Tell is the name generally given to the well-watered and well-wooded mountainous country in the north of Tunisia, lying between the valley of the Majerda and the coast of the Mediterranean, between the frontier of Algeria and the Gulf of Tunis. Sahel—literally coast lands—is the less well watered but still fertile eastern littoral of Tunisia, from Cap Bon to the frontier of Tripoli. The interior tableland, of an average altitude of 2,000 feet above the level of the sea, lies to the north of 35½° N., and extends to the valley of the Majerda. This district is watered by no perennial stream, but has a rainfall usually sufficient for raising grain crops and maintaining pasturage. The real Sahara desert lies to the south of this tableland and to the west of the narrow coast belt. A most important and interesting region of Tunisia is that round the dried-up salt lakes, in the south—the Belad-al-Jerid, or Country of Date Palms, an Arab name really restricted to a very small portion of Tunisia, but made to cover a vast

[1] The adjoining vilayet of Tripoli, which lies much further to the south, is entirely Saharan in character, but beyond Tripoli again there is the northward projection of Barka (the ancient Cyrenaica), which in some degree reproduces the characteristics of northern Tunis, Algeria and Marocco.

area of the interior of Africa on maps of the eighteenth century. These salt lakes, which now contain scarcely any water, are supposed to be a few feet below the level of the Mediterranean, and almost certainly represent a very ancient incursion of that sea. In the vicinity of these lakes innumerable springs gush from the limestone rocks and low hill ranges ; some of them are cold and salt, and others are boiling-hot and fresh. Formerly no doubt these springs, which actually form running rivers, filled up the salt-covered depressions with water ; but for several centuries past the hot fresh water, which predominates in quantity, has been almost entirely used up for the irrigation of immense forests of date palms, orchards of fruit trees, and plantations of vegetables. There is only one perennial running river of any importance—the Majerda (Makar of the Carthaginians, and Bagrada of the Romans), which rises in eastern Algeria, and flows right across northern Tunisia to the sea at Porto Farina.

The mountains in northern and western Tunisia are a prolongation of the Atlas Range. The greatest height attained is under 7,000 feet. A rather isolated and notable mountain (for picturesqueness) is Mount Zaghwan (5,500 feet), forty miles south of Tunis, and the source of water supply to that town now, as in Carthaginian and Roman times. The rather high mountains of the Tunisian Sahara (5,000 feet at most) are really the remains of an ancient plateau, and are mostly table-topped.

People, Trade and Government.—The really native population possibly reaches to 1,800,000, and consists mainly of Arabs and Berbers. The non-Tunisian or European Christian population attains a total of about 100,000 ; 50 per cent. of them are of Italian nationality, nearly 30 per cent. French and the remainder chiefly Maltese, with over 1,000 Greeks.

The occupation of the native population is almost entirely agricultural. Wheat is grown in the north and centre, barley in the east and south. Camels, horses, cattle, sheep and goats are reared in large numbers. A considerable area of the country is planted with olive-trees, the olive oil of Tunisia being the finest in the world. The extreme south also produces the best dates known to commerce. The forests of the north-west yield cork of good quality, and the steppes bordering on the Sahara grow quantities of esparto grass. In the towns are important manufactures of carpets, and a little weaving of silk.

About 60 per cent. of the total trade is carried on with France and Algeria. The United Kingdom and Malta have about 13 per cent. of the trade, Italy about 11 per cent., and Russia, Belgium, Austria, Tripoli, Scandinavia and Spain the remainder.

In the sixteenth century the native Berber dynasty of the Hafsides was displaced by Turkish invasion, which gradually settled into the military despotism of a Bey.[1] From the beginning of the eighteenth century the

[1] Bey=Colonel. The Bey was the commander-in-chief of the Turkish garrison.

Turkish family of Hussein reigned over Tunis as hereditary satraps of Turkey until 1881, when the country was placed under the protectorate of France. Since that time, although the Bey is still maintained as ruler, the country is practically governed by France through a Resident-General.

Towns.—The capital of Tunisia is *Tunis*, a city existing from before the historical period, at the head of the gulf of that name. Tunis is separated from the sea by a shallow salt lake, originally the embouchure of the Majerda River. Through this lake the French have cut a maritime canal which brings Tunis within easy access of the sea. The site of Carthage is situated about twelve miles to the north-west of Tunis. The town next in importance is *Sfax*, on the south-east coast of Tunisia. *Bizerta*, in the most northern part of the country, is at the mouth of a large and deep lake, and has been made by the French into a great military port. An interesting city to visit is the formerly sacred town of *Kairwan*, the original Mohammedan capital, founded in the eighth century. *Gafsa*, in the south, is an old Roman city with wonderful hot springs. *Gabes*, at the head of the gulf of that name, possesses a short but perennially running river, and is surrounded by an oasis of extraordinary fertility and beauty. The Island of Jerba, lying to the southward of Gabes, is supposed to be the island of the Lotus Eaters of the ancient Greek poets and geographers. In the Gulf of Gabes the Mediterranean exhibits tidal influence to a considerable extent; in places along the coast of Jerba the highest rise and fall of the tide is seven feet. Tunisia is celebrated, or should be so, for its wonderful Roman ruins. These are chiefly remarkable at Dugga, in the valley of the Majerda, at Sbeitla (the Roman Suffetula), at Feriana, at Gafsa, and at various other places in the Jerid, at Zaghwan, and finally at El Djem, which has the second largest amphitheatre in the world.

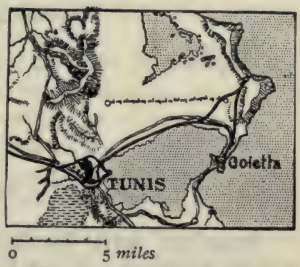

FIG. 441.—*The Site of Tunis.*

Railways.—The Bone-Guelma Railway Company of Eastern Algeria owns all the railways in Tunisia except the line from Sfax to Gafsa. The main line of the Bone-Guelma Railway runs from Sūk Ahras in Algeria down the valley of the Majerda to Tunis, with a branch to Bizerta, and with other branches to Zaghwan, Susa, Kairwan, &c. A light mineral railway has also been built connecting Sfax with Gafsa to work important deposits of phosphates.

STATISTICS.

Area of Tunisia (in square miles)	51,000
Population of Tunisia, approximately	1,900,000
Density of population per square mile	37·2
Population of Tunis	180,000
„ Sfax	40,000

APPROXIMATE COMPOSITION OF THE POPULATION OF TUNISIA.

Berbers more or less of pure race, say	500,000
Arabs, say	500,000
Mixed Arab and Berber peoples	500,000
"Moors" (chiefly the population of the principal cities, of mixed Berber, Roman, Spanish-Moor, and Christian-slave races), say	100,000
Jews, say	100,000
Sudanese Negroes, natives of Marocco, Algerians, and Turks, say	100,000
Europeans, say	100,000

AVERAGE ANNUAL TRADE (*in dollars*).

	1896–97.
Exports	7,100,000
Imports	9,220,000

IV.—TRIPOLI

By Prof. John L. Myres.

Position and Surface.—Tripoli includes all the north coast of Africa between Tunis and Egypt, with its hinterland as far south as Rhat and Fezzan, but the land frontiers are ill-defined. The coast is parted by the Gulf of Sert (the ancient *Syrtis major*), into Tripoli proper and Barka; in each division a limestone plateau approaches the sea, giving rise to milder climate, greater rainfall, and fertile coast plains of varying extent. The plain of Tripoli (Jefâra) narrows from 70 miles south of Zuara to 30 miles behind Tripoli, while west of Khoms broken highlands reach the coast. The narrow Meshiya belt round Tripoli and Tajura is irrigated from wells, but the rest is now uncultivated, and parts are sandy desert. East of Khoms the coast land is more varied, but the coast of the Gulf of Sert is quite barren. The plain of Tripoli is abruptly bounded by the limestone scarp of Jebel Nefusa, Yefren, and Gharian (2,000 feet), and the Tarhuna plateau. This hilly country is intersected by dry river-beds running towards the north-east. The Hamada el Homra, a very level, waterless plateau of red sandstone (1,500 to 1,650 feet) separates Ghadames and Rhat from Fezzan. East of the Hamada the volcanic Jebel es Soda and Haruj es Sod divide the coast steppe of Sert from the limestone Heruj el Abiad of northern Fezzan. To Fezzan also belong the oases of Jofra and Zella at the northern foot of the volcanic range. Barka is a diversified limestone tableland, rising seawards, and in the west to 3,300 feet (Jebel Akhdar), cut off from the south by the white desert (Barka el Beida), and fringed by coast plains of red alluvium. There are cavernous ravines with dense vegetation near Benghazi; otherwise the ancient forests have disappeared. The ruins of Ptolemais and Kyrene occupy strong positions on spurs of the plateau: the "Fountain of Apollo," which fertilised the latter, still flows (Ain Shehat), and similar streams from beneath the escarpments water the gardens at Derna. South of the plateau lies a depressed area, barren except for the oases of Augila, Faredgha, the headquarters of the Senussi sect, and Siva, which, however, lies in Egyptian territory.

Climate.—In the coast plains the mean annual temperature is about 70° F. A daily sea-breeze is experienced, diversified by occasional storms of rain from the north-west and of sand from the south-east. The winter storms make all the ports unsafe. In Barka the mean temperature is a little higher, with from 14 to 20 inches of winter rain. In the interior rain falls rarely, and the mean temperature rises to 82° F. in Fezzan, and 86° in Jofra, but with severe cold at night and even occasional snow on the hills. Heavy rain falls in early spring in Fezzan, but everywhere the normal water supply is subterraneous.

The date-palm grows wherever there is water, olives in some places, almonds at Ghadames, and halfa (esparto grass) on the coast moors.

People and History.—The population is throughout fundamentally Berber, but Jews have been numerous since Ptolemaic times in the coast towns. The Arab conquest modified many tribes profoundly ; and Negro elements, due to slave traffic, predominate southwards. Europeans, chiefly Italians and Maltese, are seen only in the coast towns, and Turks only in the garrisons and among the higher officials. Arabic is spoken everywhere ; but Berber dialects survive, and Hausa is spreading along the caravan routes. Tripoli is named from the "Three Cities"—Sabrata (Zuara), Oea (Tripoli), Leptis (Lebda)—which were founded by the Phœnicians, but later came under Greek influences, and passed subsequently into the hands of the Romans. In the Roman period agriculture flourished even inland, thanks to elaborate water storage in the gorges of the plateau, of which frequent traces remain. Other Roman remains are numerous, testifying to the immense prosperity of the land before the Arab conquest. Tripoli was occupied by Spain under Charles V., and the Arab dynasty was finally deposed by the Turks in 1835. Barka entered into very early relations with Greece. Kyrene, the first colony, was founded in 631 B.C., and formed, with Barka and three other towns, a "Pentapolis," which in the fifth and fourth centuries B.C. rivalled Carthage in prosperity ; then became subject to Egypt ; and was bequeathed to Rome in 95 B.C. But the Silphium plant and the pastures, on which its wealth depended, were already disappearing, and the Arab conquest completed the ruin.

Administration and Towns.—Tripoli is a Turkish vilayet, formerly including Barka, which, since 1873, has been administered separately. *Tripoli* is a walled town, the seat of the Vali and the principal garrison, with an open harbour, extensive palm groves, and important market. It is the terminus of caravan routes across the desert—(1) *viâ* Ghadames to Twat and Timbuktu, and to Rhat, Kano and Sokoto ; (2) *viâ* Sokna or Sebha to Murzuk, and so to Bornu, Wadai and Darfur ; (3) *viâ* Sokna and Zella to Aujila and Siva. It imports manufactured articles and objects of barter for the caravans, and exports ostrich feathers, ivory and skins from the Sudan ; gold dust from Twat ; halfa from the coast hills ; dates and a few cattle and horses from the littoral ; and baracans, goat-cloth and other textiles. *Benghazi*, the capital of Barka, has a small trade, chiefly with

Malta, in wool, cattle, corn (in good years), salt, sponges and a little ivory. The sponge fisheries are almost wholly in Greek hands. *Ghadames* (ancient *Cydamus*), 300 miles south-west of Tripoli, lies between the north-west border of the Hamada el Homra and the Algerian desert, in an oasis watered by warm springs, and enclosed by a ruinous rampart. The population is Berber and devoted to trade. *Rhat*, in a similar oasis south of Ghadames and 540 miles from the coast, is inhabited mainly by the Tuareg, and is the principal halt between Ghadames and Kano. *Murzuk*, a walled town in one of the central oases of Fezzan, is the principal halt on the eastern route, and the junction with a route from Rhat to Zella and Aujila.

STATISTICS (*Estimates*).

Area in square miles	400,000
Population	ca. 800,000
Density of population per square mile	2
Population of Tripoli city	30,000
„ Benghazi	15,000

V.—EGYPT

By W. F. Hume, D.Sc., A.R.S.M.,
Egyptian Geological Survey.

Position and Extent.—The political boundaries of Egypt cannot, as yet, be quite definitely stated. To the north, in latitude 31½° N., the Mediterranean forms its natural frontier; to the west it is limited by an indefinite line, generally west of longitude 25° E. through the waterless deserts of the Sahara; to the south, the provinces of the Sudan, which were in revolt under the Khalifa, extend to about 6° N. latitude; while east the Galla country, Abyssinia, Eritrea and the Red Sea, form the eastern border. To the north-east, the Gulf of Akabah, and an ill-defined line running from the port of Akabah in longitude 35° E., through the Desert of the Wanderings to Wadi Refah on the Mediterranean, separate Egypt from Asiatic Turkey.

Thus Egypt, in its largest acceptation, has a length of over 1,800 miles, from near Alexandria to the borders of Uganda, and a maximum breadth of 800 miles in the latitude of Khartum. Its northern half, as above defined, belongs to the belt of desert which stretches from West Africa to the centre of Asia, while the southern portion is occupied by grassy plateaux or wooded regions of enormous extent, which are watered by numerous tributaries of the Nile. Only between the river and the Red Sea, and in Sinai, does the height above sea-level much exceed 2,000 feet, the higher mountains of the Arabian desert attaining elevations of from 5,000 to 7,000 feet, while in Sinai the principal peaks are over 8,000 feet.

Geology.—The Egyptian Sudan and Nubian desert form part of the central core of Africa, characterised by the presence of igneous and metamorphic rocks, which, extending into the Arabian desert, give rise

to the mountainous region of the Red Sea Hills. The lower parallel ranges of Jebel Esh and Jebel es Zeit on the western, and a long ridge on the eastern side of the Red Sea, together with the principal chains of the Sinai peninsula, are of similar character. The predominant rocks are granites, gneisses, felsites, and dolerites, the hills produced by the first mentioned being particularly characterised by ruggedness of outline and steepness of slope. These are in almost all cases overlaid by a compact sandstone passing into softer sandy beds above, the Nubian Sandstone. From Assuan to Jebel Silsileh the Nile cuts through this formation, which rises in high cliffs on both sides of the river, and extends some distance into both eastern and western deserts. Thus it is known to the south-west of the Khargeh and Dakhel oases, to the east, and has also been worked by the Egyptians on the Kena-Kosseir road to the west. To the north the sandstone is succeeded by the plateau-forming limestones, and owing to their low dip to the north-west younger and younger strata come to the surface in that direction ; these are mainly of Eocene age, except in the desert near Suez, where representatives of the Miocene and Pliocene are also present. The western desert is also largely Eocene, but in the oases and on the Nile, near Esneh, Upper Cretaceous limestones have also been recorded. Contrary to the former belief, it has lately been found that the Eocene strata rest unconformably on the Cretaceous. The same succession of sandstone overlying the igneous and metamorphic rocks, and succeeded by Cretaceous and Eocene limestones, is also observed in the Arabian desert and in Sinai. In Sinai and Wadi Arabah the Nubian Sandstone has been found to contain Carboniferous fossils, but the main mass has by different authors been regarded as Triassic, Cretaceous, and Eocene, the lack of organic remains rendering the determination difficult.

Climate.—Owing to the diversity in its surface features, the climate of Egypt is of very varied character. In the equatorial lands of the southern Sudan the rainy season lasts for ten months, and even in November and December, the dry period, storms are not infrequent. In latitude 8° N. the dry seasons are separated by two rainy periods, a light and a heavy ; the former lasting from March to April, while the latter begins about the middle of May, and often continues far into October. But even in the wet season the thunderstorms and showers do not last long, though recurring constantly after the midday heats. Further north, between Khartum and Shendi, the rainy season is much shorter, while in Upper Egypt and parts of the western deserts rain is almost unknown. Thus there is a transition from regions of excessive rainfall to those of absolute rainlessness. The presence of the Mediterranean on the north and the high mountains in Sinai and the Red Sea Hills, to some extent increase the rainfall in their immediate neighbourhood. Thus the mean for fourteen years at Alexandria is eight inches, at Cairo only one and a-half, and at Kina practically nil, the rainfall thus obviously diminishing with distance from the sea.

In the Sinai peninsula sudden thunderstorms are not infrequent in December, January and February, accompanied by a heavy downpour, the dry torrent beds becoming suddenly flooded, thereby occasionally causing much destruction to life and property; while on the higher summits light falls of snow and the formation of ice are frequently observed. This range forms a protection to the Arabian desert, in whose hills these sudden storms are rare and less destructive, no important rains having fallen between 1892 and 1898. The air of the desert is dry and invigorating, and contrasts with the comparatively damp atmospheres of Cairo and Alexandria, but especially with the moist conditions of the Sudan.

In northern Egypt the winds blow for the greater part of the year from the north and north-west, the latter sometimes lasting for a month without intermission, while from February to June south-easterly and south-westerly winds are more prevalent. During these months the Khansîn —a sand-laden, dry wind—blows at frequent intervals, and is always accompanied by a marked rise of temperature. The temperature is lowest from the end of December to March, the lowest recorded in the Delta being 35° F., in Alexandria 40°, in Cairo 31°, and in Upper Egypt 41° F. In the desert the temperature frequently falls below freezing point; in Sinai, at a height of 5,000 feet, 15° of frost having been recorded, and in the Libyan desert 23° F. The heat begins to increase in April, but full summer usually commences in June, when temperatures between 80° and 90° F. are the rule, even at midnight. The ten years' mean average for the Delta and Cairo is 58° F. in winter, 78° F. in spring, 83° F. in summer, and 66° F. in autumn, while during the period of hot winds as much as 114° F. in the shade has been recorded. Further south 109° F. in the shade has been observed in Upper Egypt, while in the oases and the Sudan the temperature occasionally rises to over 120° F.

The Nile.—The whole country is watered by one river-system—that of the Nile. Rising between 2° and 3° S., where several branches unite to form the Kagera, it flows through the Victoria Nyanza, and entering the northern end of the Albert Nyanza immediately flows thence as the Bahr-el-Gebel. In about 9° N. this river is joined by the sluggish Bahr-el-Ghazal, or Gazelle river, draining the Bongo and Niam-Niam countries on the west, and by the more rapid Sobat, rising in the Galla highlands on the east. The joint streams form the Bahr-el-Abiad, or White Nile, which meanders northward through the grassy plains, or dense thickets and forests of the Sudan. About 16° N., where Khartum stands, it receives one of its most important tributaries—the Bahr-el-Azrak, or Blue Nile, a rapid and turbulent torrent, descending from the southern highlands of Abyssinia. Still further north, 180 miles below the confluence, the Nile is joined near Berber on the east by the Atbara, which drains the northern highlands of Abyssinia. From this point onward the Nile assumes those characteristics which have made it the most remarkable of rivers, flowing for a distance of 1,800 miles without receiving

a single affluent, and running in a valley which is simply a cleft in the desert plateau, the cliffs on both sides of its alluvial plain rising in many cases to a height of over a thousand feet. The maximum breadth of the river below Khartum is not more than 1,100 yards (near Minieh and Cairo respectively), except during the period of flood, while the "cultivation," or land which is subject to the influence of its fertilising waters, does not exceed nine miles in breadth at any point. The actual Nile valley, however, is much broader, in parts of Egypt proper being over thirty miles in width, but narrower in Nubia, where five to six miles is a fair average. The river itself is navigable throughout its whole length, except when it issues from the Albert Nyanza in a series of rapids near Wadelai, and at the six Cataracts, between Khartum and Assuan, where it has forced its way through granite and syenite barriers.

The long, narrow valley terminates at Cairo, where the Nile branches,

FIG. 442.—*The Delta of the Nile and Suez Canal.*

mainly discharging its waters at the present time through two channels, named—from the towns where they enter the Mediterranean—the Rosetta and Damietta branches. The district included between these two arms was called the *Delta* by the Greeks from its resemblance to the Greek letter Δ, the apex of the triangle being at Cairo, and the base the Mediterranean shore line between Alexandria and Port Said, over 150 miles in length. The area thus defined embraces the most fertile region in all North Africa.

Thus there are three geographical divisions dependent on the character of the Nile itself:—(1) The Egyptian Sudan, including all the country south of Khartum; (2) the Nile Valley; and (3) the Delta. There are in addition two vast desert regions, separated by the Valley of the Nile, and

standing in sharp contrast to one another :—(4) The Libyan Desert on the west ; and (5) the Arabian and Nubian Deserts on the east.

The Nile Floods.—In the Nile valley the seasons are determined by the rise and fall of the river, these movements depending on the amount of rain which falls in the Abyssinian highlands. The waters begin to rise in the upper reaches in the beginning of June, the rise being observed at Cairo three weeks after it has commenced at Merawi. In early October the maximum elevation is obtained, forty-one feet above ordinary Nile level being at present the most favourable for agricultural purposes. On the annual occurrence of the inundations depends the existence of the Egypt of history and commerce ; its prosperity is due to the soil thus brought down from Abyssinia, which, distributed over the alluvial plain, is the source of the great fertility of this portion of the country.

The insoluble material in Nile mud is remarkable for the uniformity of its grain, the particles being very minute. The coarser minerals, which themselves are minute, are mainly such as would be derived from igneous rocks—viz., quartz, felspar, hornblende, and epidote, and recent borings have shown that the delta mud, which is itself of great thickness, is underlain by thick beds of gravel containing pebbles of limestone, granite and andesite, clearly indicating a period of greater rainfall and more abundant torrent-action in the past. Indeed, it has been held by many geologists that the Nile was formerly a negative delta, or narrow arm of the sea, and it is a noteworthy fact that the deepest borings undertaken in the Delta (375 feet at Zagazig) have never yet reached bed-rock.

The construction of a great storage reservoir for the surplus flood waters by building a dam across the Nile valley above Assuan was completed in 1902, and so a regular supply for irrigation in the lower valley and in the Delta during the period of low Nile has now been secured.

Natural Resources.—For many centuries Egypt was practically the granary of the Byzantine Empire, and wheat still plays an important part, occupying 50 per cent. of the fields in Upper Egypt and 30 per cent. in the Delta, and in the extent of its cultivation rivalling maize and durrah, or Indian millet. Clover, beans and barley are also grown, but in recent years cotton has tended to become the one crop of economic importance. The cereal crops are usually sown between the middle of October and end of December, and harvested from the middle of February to the end of April, the seed time and harvest being earlier in the southern than in the northern provinces. Cotton and tobacco are chiefly cultivated in Lower Egypt from April to August ; cucumbers and water-melons also form an important local staple. Of recent years rice and sugar-cane have been introduced with success, the moist lowlands of the Delta being especially favourable to their development. Flax, henna, indigo, and castor-oil are also produced, flax forming a not unimportant article of export.

Among fruit trees, the date palm holds the first place, groves of this tree extend along the banks of the Nile as far south as Fashoda, and it is grown in

the oases and even in the wild valleys of the Sinai peninsula, but the dates produced are mainly for home consumption. The vine, orange, mandarin, lemon, melon and fig are also plentiful in the Nile valley, while bananas are cultivated in the Sudan. The trees most common in the Nile valley and the oases are the date palm, the *Acacia Nilotica*, or sunt, and the sycamore. In the oases the two former are present, and the dates obtained are superior to those of the rest of Egypt. The Sinai peninsula is also not so barren as is generally supposed, the date groves of the Wadi Feiran being especially striking, while tamarisk bushes abound in the principal valleys; nor is the Arabian desert devoid of vegetation, tamarisk and scattered examples of the thorny acacia (*A. seyal*) and *Majinga* being found in the high mountain valleys. In the Sudan, on the contrary, forests are frequent, but of mixed character.

The chief domestic animals employed in transport are the camel, donkey, horse, buffalo and ox, while flocks of goats and sheep, especially the long-eared *kharûf*, constitute an important source of wealth. The lion and leopard are now almost restricted to the Sudan, but a few leopards are met with in the peninsula of Sinai. The hyæna and jackal lurk in the old ruins and caves of the plateau limestone, while the long-eared fennec fox is not uncommon in the desert. The ibex (*I. sinaiticus*, bedan, or tetel) is limited to the mountains of Sinai and the Arabian desert, various species of antelope and gazelle also wandering in the lower desert valleys. The elephant, hippopotamus, chimpanzee and other apes, and the giraffe, only occur in the Sudan, while the crocodile is now very rare north of Assuan. Sand grouse, red partridge, and quail are of frequent occurrence in the desert, while geese, wild pigeon, and duck yield sport in the Nile valley. The flamingo, ibis, sultan bird, and heron also breed in the Delta and the Fayum. In the Sudan the ostrich in the desert, guinea fowl in the woods, waders, darters, and cranes on the upper reaches of the river, form part of the varied life of the tropical regions.

The mineral resources are at present of secondary importance. Alabaster has been quarried near Assiut. But the ancient Egyptians sought most of their monumental stones further to the south, the sandstones, diorites, &c., used in many of the large temples being quarried on the Kena-Kosseir road in the Arabian desert, and the granite from the quarries near Assuan. The Romans, too, busily searched this eastern desert, exploiting the beautiful red porphyry of Jebel Dokhan and granites of Mons Claudianus, near 27° N. Nor less famous are the now unworked emerald mines of Jebel Zebara, and the turquoise and copper mines of Maghèra and other places in Sinai, which were once the centres of an active Egyptian mining industry. In addition Jebel Zeit, on the Red Sea, was, within recent times, exploited for petroleum. Speaking generally, however, the old mines at present add nothing to the resources of the country.

Ancient History.—The records of Egypt that have been preserved on monument and temple go back to so remote an antiquity that it might be

said the dawn of the history of Egypt is the dawn of history itself. It is a remarkable fact that not only was the Egyptian Empire the most ancient, but it was likewise the most durable the world has ever seen, with one exception being unaffected by foreign invasion over a period exceeding two thousand years. The explanation of this continuity is to be found in the geographical position of Egypt itself, the sea in the then state of navigation being an efficient protection on the one hand, and the desert an effectual barrier on the other.

Menes, the founder of the first historical dynasty (in 4400 B.C., according to Brugsch), founded Memphis, near the site of modern Cairo, which occupied a strategical position commanding the Delta and the valley of the Nile. Commencing with this monarch, historians have grouped the Egyptian sovereigns, as recorded on the monuments, into twenty-six dynasties, lasting till the Persian invasion. Civilisation was already highly developed, especially as regards architecture and engineering. Cheops, Chephren, and Mykerinos, of the later dynasties, are well known as the builders of the three great pyramids of Ghizeh. Under the XIIth dynasty Thebes became the capital, and Amenemhat III. was the first to utilise the inundation of the Nile, by constructing Lake Mœris in the low-lying Fayum ; it was also at this time that the sceptres of Upper and Lower Egypt were united (2466 B.C., Brugsch). The one interruption in the long line of Egyptian kings was a successful invasion by an unknown Eastern race, who founded the two dynasties of the Shepherd Kings, or Hyksos (XV. and XVI.), and it is during this period that Joseph is believed to have been in power. The Theban kings of the XVIIth dynasty expelled the invaders, but it was during the XIXth that Egypt reached its greatest development, Rameses II., supposed to be the Pharaoh of the Oppression, extending his sway south to Dongola, and north to Asia Minor.

During the reign of Tirhakah the Ethiopian (XXV.) Memphis fell into the hands of the Assyrians, who set up creatures of their own in Lower Egypt. This was regained by Psammeticus I., founder of the XXVIth dynasty, with the aid of Greek mercenaries. Nevertheless, this temporary foreign conquest was the first sign of decadence in the old empire, which in 525 B.C. fell under the Persian domination of Cambyses. A century later the Egyptians again reasserted their independence, but in 340 B.C. the Persians gave the death blow to the ancient monarchy. The renewed Persian rule lasted but six years, when Alexander the Great took possession of the country and founded Alexandria, which soon became the centre of Greek culture and of the commerce of the then known world. On the division of the Macedonian kingdom at the death of Alexander, one of his generals founded the dynasty of the Ptolemies, which lasted to 42 B.C. With the death of Cleopatra after the battle of Actium, Egypt became part of the Roman Empire under Augustus, with which it was connected from A.D. 27 to A.D. 395, when, on the partition, it was merged with the Eastern or Byzantine dominions. The most notable feature during the

Roman occupation was the rapid spread of Christianity and monasticism in the country, while somewhat later a Christian kingdom arose in Nubia.

Modern History.—In 638 A.D., only sixteen years after the flight of the Hejira, Amr-ibn-el-Asi conquered Egypt and started the Mohammedan-Arab domination, which lasted for about nine hundred years, the country during the rule of the Fatimite sovereigns (969–1171) being in an especially flourishing condition. In 1240 Melik-el-Salah founded the Mameluke dynasty, having been placed on the throne by the Mamelukes, descendants of slaves who formed the bodyguard of the Caliphs, but in 1517, on the deposition of Tumân Bey, by the Sultan Selim I. of Constantinople, Egypt became a Turkish pashalik. The Mamelukes still retained a large share of power down to 1798, when Napoleon I. stormed Alexandria and overthrew them at the battle of the Pyramids. The defeat of the French fleet at Aboukir by Nelson obliged the French to evacuate Egypt in 1801, Mohammed Ali, the founder of the present reigning house, being appointed Pasha of Egypt in 1811. Though still remaining nominally under Turkish rule, Egypt then became practically independent, except for the payment of an annual tribute, and the necessity of each succeeding ruler receiving a firman of appointment from the Sultan. In 1866 the Porte raised Ismail Pasha to the rank of Khedive, or viceroy, which became hereditary. During the reigns of Said and Ismail, French influence was predominant, and in 1869 the construction of the Suez Canal was successfully accomplished by M. Ferdinand de Lesseps. Owing to the maladministration of Ismail, the public debt increased enormously, and in 1879 the European Powers called upon Turkey to depose the viceroy. In 1882 as the result of a revolt against European control, and upon France declining to join the United Kingdom in an armed demonstration, the British fleet bombarded Alexandria and the British army occupied Egypt. Some of the effects of the occupation have been the reorganisation of the Egyptian army, finances, and judiciary, the abolition of compulsory labour, or the corvée, and the carrying out of a more perfect system of irrigation, which had already been partly planned by French engineers. Meanwhile, a rebellion had commenced in the Sudan (which had only been conquered under Mohammed Ali and his successors), led by a chief who had taken the title of Mahdi, or prophet. After several unsuccessful expeditions had attempted to quell the revolt, Khartum was captured by the Mahdists in 1885, on the eve of being relieved by a British force, and the Sudan was abandoned for ten years. In 1898, after two years of slow but steady advance southward, Lord Kitchener at last crushed the forces of the Khalifa (the Mahdi's successor) by the capture of Omdurman, opposite Khartum. The Khalifa was finally defeated and slain by Sir R. Wingate in 1899.

People.—It appears probable that the first civilised Egyptian invaders were of Caucasian origin, and came from an original home in Asia, but of the peoples previously inhabiting the country no records have at present been found. The Fellahin, or peasant dwellers on the Nile, are

probably direct descendants of those who were the cultivators in early days. The reason of their conservatism as regards habits and made of life is to be sought in the uniformity of the conditions by which they were surrounded, depending on the regularity of the seasons determined by the rise and fall of the river. They are of medium height and of somewhat heavy build, with high cheek-bones, receding forehead, and thick lips, and in colour varying from light to dark brown, according to the latitude. In belief the fellah is a Mohammedan, but his religion is tinged with remnants of the older Egyptian worship, many of the ceremonies still savouring rather of the cult of Isis than of the creed of Islam. They number about 2,000,000.

The Copts, who are the remnants of the dominant Egyptian race, are chiefly resident in the large towns, where they are watchmakers and goldsmiths, and are very often possessed of considerable wealth. They are usually easily distinguished, as they wear a black turban, and in build are somewhat below middle height, with small hands and feet, and comparatively fair complexions. The Copts in religion are professedly Christian, having many of their rites identical with those of the Greek Church. They have preserved their faith in spite of the many centuries of Moslem domination, still possessing a number of large churches and many schools. They number at the present time 800,000 souls, and the teaching of the Coptic language, a modified dialect of the ancient Egyptian, is now compulsory in the schools supported by this community.

In the desert wander the nomadic Arab tribes generally classed together under the name of Bedouin or Bedawîn, the principal of these being the Towarah, in Sinai ; the Maazeh, in the northern part of the Arabian desert down to lat. 27° N. ; the Ababdeh, south of the Kena-Kosseir line ; the Bisharîn, in the deserts of Assuan ; and the Hadendoa, in the direction of Suakin. Still further south are wild tribes including the Baggara, the backbone of the Khalifa's army, while the Aulad 'Ali Bedawîn inhabit the western desert. All these tribes are nomadic, wandering from place to place, and pitching their tents wherever food and water supply are favourable. The free life gives them independence of character, and a pride which poverty cannot erase. The western Bedawîn and the Maazeh are often strict Mohammedans, and the southern tribes were famous for their fanatical support of the Mahdi, but the others are very little affected by their nominal religious beliefs, and the Towarah scarcely know anything of Mohammed, Moses being their chief prophet. The typical Bedawîn is of slender build, with thin neck and limbs, and of a dark brown complexion.

The Arabs of the towns are a somewhat indolent race, contact with Turks and Europeans having caused them to lose the finer characteristics of their desert neighbours, though they are often of ready wit, and amiable in disposition. The great majority have delicate features, the complexions being often whiter than those of the average European. Arabic is the

common language in all the region north of Khartum, replacing Coptic after the conquest of Egypt by 'Amr in 640 A.D.

A great part of the Sudan is occupied by about twenty different negro races of too varied a character to permit of further description here.

Government.—The government of Egypt is under the control of native Ministers, themselves subject to the Khedive, there being in addition a British financial adviser, without whose permission no financial decision can be arrived at, but he is not an executive officer. In addition, there is a Legislative Council of thirty members, fifteen residing in Cairo and fifteen coming from the provinces, to whom all general laws are submitted for examination; while a General Assembly has to be summoned every two years, without the consent of which no direct personal or land tax can be imposed. In addition the British Consul-General has large powers of an undefined character.

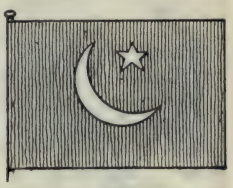

FIG. 443.—*The Egyptian Flag.*

Internal Communications.—The Nile is the chief medium of communication from the Sudan to Alexandria, while in the Delta a system of canals radiate in every direction. Railways, too, now run from Alexandria, Port Said, and Suez to Cairo, whence another line follows the Nile valley southward, and was opened to Khartum in 1899. Communications with the desert regions and shores of the Red Sea are only maintained by means of camel caravans or steamers from Suez.

Political Divisions and Towns.—Egypt is divided into Governorships and Mudiriehs, there being twelve of these in Lower Egypt, nine in Upper Egypt and one for the Oases. The Mudirs have wide powers over internal administrations, each town and village having in addition a Sheikh-el-beled, or mayor, who is responsible to the Mudir. The two provinces into which Egypt, north of the Sudan, is divided are of unequal size, Lower Egypt being the smaller, but containing the Delta and Cairo, while Upper Egypt mainly consists of desert country and the long Nile valley.

The principal town is *Cairo*, the largest city in Africa, occupying the commanding position at the junction of the valley of the Nile and the Delta. It has the Khedive's palace, the usual government buildings, old mosques, picturesque streets, and a great museum of Egyptian antiquities. On account of its good European hotels and its dry climate it has become a great winter resort for wealthy Europeans and the centre for the tourist traffic on the Nile. *Alexandria*, the principal port of Egypt, is a purely commercial town trading with Europe; *Tantah*, occupies an important central point in the Delta itself; *Port Said* and *Suez* derive their importance from being at the northern and southern terminations of the Suez Canal. *Assiut*, *Naghamadi Kina*, *Assuan*, *Wadi Halfa*, *Dongola*, and *Berber* are the principal towns on the Nile itself, while *Khartum* at the junction of the two Niles, was, and will again become the centre of Egyptian trade

with the Sudan. A college in memory of General Gordon has been established there as a centre of education for the natives. The Sudan has been reorganised under joint British and Egyptian control, with a military governor entrusted with very large powers.

FIG. 444.—*The Provinces of the Reorganised Sudan.*

The Suez Canal.—This great waterway connecting the Mediterranean and the Red Seas, has become the main channel of communication between Europe and the East (Fig. 442). From Port Said to Suez it has a length of 87 miles with surface breadth of from 65 to 120 yards, and a depth of 26 feet, and runs for 21 miles through the Great Bitter Lake and Lake Timsah. Under a special convention it has been neutralised by the Powers and is managed by an international commission. On the average ten vessels pass through the canal every day, and seven out of every ten are under the British flag. The value of the canal is mainly felt on the routes to India, China and Australia; steamers trading to New Zealand find it as economical to spend a few more days on their voyage out by the Cape of Good Hope and home by Cape Horn as to pay the heavy canal dues.

The Libyan Desert.—Beyond the narrow fertile belt nourished by the Nile, in which the population of Egypt is concentrated, and on which the importance of the country depends, there are vast deserts on either side, many parts of which are unexplored. The Libyan desert, on the west, is an immense stony plateau from 600 to 1,000 feet above the Nile level, and rising in a series of gentle steps towards the interior, a few isolated sandhills or low cliffs being the only elevations in the apparently horizontal expanse. A series of deep depressions, sharply defined by the precipitous walls of the plateau, occurs in this desert more than 100 miles from the Nile, constituting the celebrated oases, named, beginning with the southern —Khargeh, Dakhel, Farafah, and Baharieh. The last named is connected by a number of minor uncultivated depressions containing salt lakes, with Siva, the ancient oasis of Jupiter Ammon, which lies over 300 miles west of Cairo, and is inhabited by the fanatical Senussi Arabs. South of Khargeh this line of depression approaches the valley of the Nile. Owing to the existence of numerous springs in these districts certain portions are extremely fertile, and during many centuries have been centres of population and cultivation. To the west of them extend the unexplored wastes of the Sahara, whose wind-blown sands are piled up into shifting dunes often from 300 to 400 feet in height.

The Arabian Desert.—The Arabian or eastern desert is of a very different character. To the south of the latitude of Assuan it forms a maze of mountains and hills which have been but little explored, while sandy

wastes are replaced by wadis covered with the angular *débris* derived from the surrounding elevations. To the north of 27° N. the arrangement of valley and mountain is more regular, the waterless, steep-sided limestone plateau (which extends in places for over 50 miles east of the Nile) being separated from the Central Red Sea Chain by the broad Wadi Kena, which runs north-west for about a degree of latitude, the mountains also trending in the same direction. Lesser hill and valley systems run more or less parallel to each other, to the main range, and to the Red Sea. The flat limestone plateau is about 1,200 feet above Nile level, while the Red Sea Hills, which are characterised by the extreme ruggedness of their outline, are over 6,000 feet high in the Ghattar and Um Delpha (Es Shayib) massifs. At the northern end of the chain, Jebel Gharib nearly attains the same elevation. North of 28° 45′ N. the limestone plateau occupies the whole region, giving rise to the desolate, steep-sided hills of Gallala, while west of Suez and Ismailia the country consists of broken ridges, arid sand and pebble desert. This inhospitable region is traversed in 29° N. by the wide Wadi Arabah, which runs east and west from the plateau to the Red Sea.

The Peninsula of Sinai.—This peninsula, which is the sixth division, is closely connected with the Arabian desert system, and consists of a central mountain mass separated from the Red Sea by the plain of El Gaah, and small ranges parallel to the same sea. On the north, sandy plains and lower sandstone ranges intervene between the main chain and the desolate plateaux of the Desert of the Wanderings, while on the east runs the deep Gulf of Akabah, which forms part of the great rift valley extending from the Sea of Galilee to Lakes Tanganyika and Nyasa.

STATISTICS.

	1882.	1897.
Area of Egypt (excluding Nubia and Deserts)	10,340	10,340
Population of Egypt „ „	6,575,958	9,494,023 [1]
Density of population	636	918
Population of Cairo	368,108	570,062
„ Alexandria	208,755	319,766
„ Tantah	33,725	57,298
„ Port Said	16,560	42,095
„ Assiut	—	42,012

ANNUAL TRADE (*in pounds sterling*).

	1881–85.	1891–95.
Imports	8,000,000	9,000,000
Exports	12,200,000	12,700,000

TRADE THROUGH SUEZ CANAL.

Year.	No. of vessels.	British vessels.	Total tonnage.	British tonnage.
1888	3,440	2,625	8,183,313	7,335,062
1896	3,409	2,162	12,039,859	8,057,706

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[1] Population of Nubia by Census of 1897 = 240,382.

CHAPTER L.—EAST AFRICA

I.—EASTERN EQUATORIAL AFRICA

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Position.—Abyssinia, Eritrea, Somaliland, and British East Africa, with the off-lying islands from Sokotra to Zanzibar, may be conveniently grouped together as Eastern Equatorial Africa. This section of the continent is bounded to the east by the Red Sea and Indian Ocean, to the west by the watershed separating the Congo and Lake Chad from the Nile, to the north by the deserts of Kordofan and southern Nubia, and to the south by the frontier of German East Africa.

FIG. 445.—*The East African Rift-Valleys.*

Configuration and Geology.—The general configuration of this area is simple. The region is part of an ancient plateau which once extended across tropical Africa, and was probably continuous with the peninsular area of India. The height of the country has been increased in places by broad sheets of volcanic rocks, which are sometimes piled up into lofty peaks and craters; in other places the level has been lowered by the sinking of belts or broad areas of land, as along the coastal plain, the basin of the Victoria Nyanza, and the Nile and Eritrean rift-valleys.

The arrangement of the river systems has been mainly determined by the lines of subsidence. The most important river is the Nile, of which the Victoria Nyanza is the principal source; this lake discharges northward by the Somerset Nile, which enters the northern end of the Albert Nyanza. There the main Nile is increased by the rainfall on both flanks of Ruwenzori and by the surplus waters of the Albert and Albert Edward Nyanzas. Leaving the former lake the Nile

flows northward, and after a course of 500 miles is joined by the Bahr-el-Ghazal, which drains the region north of the Congo basin and east of that of Lake Chad. On the east bank the chief tributaries are the Sobat, the Blue Nile and the Atbara, which drain the highlands of Abyssinia. East of the Nile is a zone of internal drainage along the Eritrean rift-valley. The chief rivers of this system are the Hawash and Omo of southern Abyssinia; the Turquell and Kerio, which flow into the southern half of Lake Rudolf, and the Murendat, which enters Lake Naivasha. The third set of rivers flow eastward into the Indian Ocean, the most important are the Webi Shebeyli, the Jub, Tana and Sabaki.

The lake system is one of the most striking geographical features of the region. The lakes are of two types, broad round lakes in depressions on the plateaux such as the Victoria Nyanza and Lake Tsana, and long narrow lakes in the two rift-valleys. In the western rift-valley occur Tanganyika, the Albert and Albert Edward Nyanzas; in the eastern or Eritrean rift-valley are Lakes Dembea, Abbaya, Stefanie, Rudolf, Baringo, Losuguta, Elmetaita, Naivasha, and the dried up Lake Suess.

The mountains belong to four groups—(1) ridges and blocks of old Archæan rocks, either left standing above the general level owing to the superior hardness of certain bands, *e.g.*, the Taita Mountains, or raised by crustal movements as in the high snow-clad ridge of Ruwenzori; (2) lines of volcanic craters, *e.g.*, the Kyulu Mountains of Ukamba; (3) isolated volcanic peaks, *e.g.*, Kenya (17,000 feet), Ruwenzori (18,000), and Elgon (14,000); (4) the scarps of fault lines such as the Mau and Kikuyu scarps of the Eritrean rift-valley, the Laikipia scarp, east of Baringo, or the eastern face of the Abyssinian plateau.

Geologically, Eastern Equatorial Africa consists of a plateau of Archæan rocks (gneiss, schists, amphibolites, &c.). On the eastern flanks of the plateau are some fossiliferous rocks; some Permo-Carboniferous shales occur in the Sabaki valley, and some obscure older fossils have been found near Mombasa, and a belt of Jurassic rocks may be traced from German East Africa along the coast and up the Jub to Abyssinia, where some Cretaceous rocks have also been found. Later, volcanic action began by the eruption of some lavas (monchiquites) on the coast, vast sheets of volcanic material were spread over the plateau from the Athi plains to the uplands of Abyssinia. Volcanic action continued for a prolonged period; some of the craters, such as Longonot near Naivasha, are quite recent, and some are said to be still in eruption. Fumaroles and hot springs are common in the districts where volcanic fires lingered longest.

Climate.—The region lies wholly within the tropics and is traversed by the equator, but the heat is not as a rule excessive. On the coastal plain and at Zanzibar the air is very moist, and the daily variations in temperature are slight. On the plateaux, and especially on the bare, sandy plains, the Sun's heat is very powerful in the day, while the nights are often cold. The rain falls at two seasons, the "big rains" of the spring and the "small

rains" of the autumn. The amount, however, is very uncertain. On the sandy plains of the Nyika the rainfall is small. It is heaviest on the high forest belts, where, moreover, the separation into wet and dry seasons is less definite. Frosts are not uncommon above the height of 6,000 feet; snow falls on the higher mountains of Abyssinia and Elgon, and is permanent on Ruwenzori and Kenya. The latter has a system of small glaciers.

Flora and Fauna.—The character of the flora varies largely with the altitude. On the coastal plains and islands there are palm-groves, fruit orchards, spice plantations, and common members of the Indian flora. On the sandy plains there is a scanty growth of acacia, thorn scrub, scattered tufts of dry grass, and trees with succulent stems like the candelabra-shaped euphorbias and the fibre-yielding Sanseviera and aloe. Districts that are better watered and have richer soil are covered with woody flowering shrubs. On the plateau there are belts of forest with many coniferous trees, and above these is a zone of bamboo jungle reaching up to the level of over 9,000 feet. Still higher are alpine meadows with plants belonging to Mediterranean genera; many of these northern plants, such as the groundsel, lobelia, and heath, which in Europe grow as small low herbs, are represented on the East African mountains by tall woody trees.

The most conspicuous features in the animal life of the region are the big mammals, such as the elephant, rhinoceros, hippopotamus and giraffe; antelope are numerous, but there are no deer. Crocodiles, pythons, cobras, and puff adders are the most important reptiles. Vast flocks of pink flamingoes on the salt lakes, and of pelicans on the borders of the low-level lakes and swamps, weaver birds on the river banks, and sun-birds on the high mountain meadows of Kenya and Ruwenzori, are the most conspicuous of the birds.

Natural Resources and Trade.—In East Africa trade as yet is unimportant. The soil, especially on the volcanic regions and alluvial river plains, is very fertile—when well watered. The lowlands near the coast and the islands of Zanzibar and Pemba grow spices and the usual tropical products. The sandy plains support abundant fibre-producing plants. The vines and lianas that hang over the trees of the lowland forest belts secrete india-rubber. Herds of cattle live on the plains, but they are periodically decimated by rinderpest, and their distribution is restricted by the tsetse fly. Useful timber is scarce, but it would grow in many districts that have been deforested by man and prairie fires. The mineral wealth has not yet been prospected. Iron ore is universally distributed, and is often of good quality, but it is commercially useless owing to scarcity of fuel. Gold occurs in Abyssinia, some silver and lead near Mombasa; but there is no proof that they are abundant, and the general conditions do not suggest more than occasional patches of valuable ores. In the absence of mineral wealth, the economic value of the country appears slight owing to the thinness of the population, irregularity of rainfall and difficulty of internal communications. At present the only valuable product of the interior is ivory.

The main exports are ivory, rubber, copra, hides, cloves and gums. The principal imports are cotton cloths, iron and brass wire, beads, and, where not excluded by the enforcement of the Berlin Act, guns and ammunition.

There are no manufactures ; some of the inland tribes can work iron, procured either as iron-wire from trading caravans, or by collecting grains of iron oxide from the streams ; most of the people can tan leather, and some tribes such as the Waganda prepare a kind of cloth of bark. On the coast lands grass mats and baskets are woven. The arts and agricultural methods are extremely primitive.

The usual native method of internal communication is by caravans of porters carrying loads on their heads (the Zanzibari), or on sticks resting on their shoulders (Abyssinians). Donkeys are available in some districts, mules in Abyssinia, and camels in Somaliland. Dug-out canoes are used by the Pokomo on the Tana, and by the Shilluk on the Sobat and the Nile ; but with the exception of the Nile the rivers are of little use as waterways.

The Native Peoples.—The natives belong to five chief groups. The main basis of the population in the southern part of the region is Negro, of the Bantu division. Members of this race occupy the islands of Zanzibar and Pemba, and range along the coast as far north as the Jub ; they extend westward as far as the eastern rift-valley, with occasional outliers beyond. The principal Bantu tribes are the Wakamba, Pokomo, Wataita, Wanyika. The members of these tribes are copper-coloured, have curly hair, thick lips, projecting chins and broad noses. These tribes are included with most of those of southern Africa in the Bantu group owing to the general grammatical resemblance of their languages, which are characterised by the inflexion of the first syllable, and by the use of sentences which consist of several words fused into one. The most important of the Bantu languages is Suahili, which serves as the *lingua franca* of Eastern Equatorial Africa. The Suahili occupy the coast-lands and islands between the Jub river and Zanzibar. The race is very mixed and has been formed by the intermarriage of Arab traders with the natives of various Bantu tribes. Similar mixed races occur on the northern and western margins of the Bantu area. Thus the Waganda are Bantu improved by an infusion of Hamitic blood, due to the conquest of Uganda by a band of Wahuma warriors. The Kikuyu are probably a similar mixture of Bantu and Nilotic races, and are therefore to be included among the Negroid tribes. The Nile basin is the home of another race-group, the Nilotic ; the Bari of the Upper Nile is the most representative tribe of this group, of which another, the Masai, has forced its way along the Eritrean rift-valley as far south as German East Africa. Abyssinia is inhabited by a great mixture of races, Semitic, Hamitic, and Negroid. At one time the dominant tribe was Semitic, but at present the Hamitic Shoans hold the reins of power. Somaliland is occupied by Hamites, whose ancestors crossed from Arabia ; to the south of the Somali are the remnants of the nearly allied and once powerful tribe, the Galla. The

last group represented in Eastern Equatorial Africa are the dwarfs or pygmies, probably the survivals of a once widely scattered race, now almost extinct. Typical "Negrillo" dwarfs, similar to the "Akka" of the Welle, occur on Ruwenzori, while hybrid tribes, such as the Doko of Laikipia and Shoa, live in the forests of the eastern plateaux.

ABYSSINIA

Configuration.—Abyssinia (or Ethiopia) consists geographically of the rugged plateau country, mostly 8,000 feet above sea-level, which surrounds the head streams of the Atbara and Blue Nile. It is bounded to the north by the deserts of southern Nubia, to the east and south-east by the western wall of the Eritrean rift-valley, to the west by the Atbara and the lowlands of the Nile basin, and to the south by the angle between the Omo and the head streams of the Sobat. Politically the country is more extensive, especially to the south-east, as since 1887 the Abyssinians have held Harrar, and a large tract to the east of the Eritrean rift-valley; to the south Abyssinia claims districts which are also claimed as within the British sphere. Ethnographically Abyssinia is a confederation of very different and often hostile tribes; the name of the people Abeshi, *i.e.*, Mixed, refers to this fact.

The configuration of Abyssinia, in the geographical sense, is simple; the country consists of a block of Archæan gneiss and schists, which has been intensely eroded by subærial agencies; it has been capped by sheets of lava, and is flanked by Jurassic limestones; in places huge piles of volcanic *débris* form mountains reaching the height of from 15,000 to 16,000 feet in Semien. In the centre of the country is a great depression occupied by Lake Tsana (1,200 square miles in area), which is the principal source of the Blue Nile.

People and History.—Unlike the other political divisions of East Africa, Abyssinia has a history, which dates back to a very remote period. The country is probably the Cush of the Scriptures, and according to local belief it was the home of the Queen of Sheba. The "emperor" claims his descent from Menelik, the son of Solomon by the Queen of Sheba; and one tribe, the Falashas, claim, though erroneously, to be of Jewish origin. The country was early converted to Christianity by the Coptic Church; the language of the Abyssinian church is the oldest known form of Himyaritic, and was once spoken in the province of Tigré.

Muhammed Granye, of Harrar, invaded Abyssinia from 1528 to 1540, in order to convert the country to Mohammedanism, in which he nearly succeeded. Efforts to convert the people to the Roman Catholic Church led to the exploration of the country by Portuguese Jesuits in the 16th and 17th centuries. The Tigrians were then the dominant race, but when Bruce travelled through Abyssinia at the end of the 18th century, the Amharites held supreme power. The country was invaded in 1867 by a British expedition sent to punish King Theodore of Amhara. His successor,

John, was killed by the Mahdists in 1889, and on his death, by the aid of the Italians, Menelik of Shoa seized the sovereign position of Negus Negusti, or King of Kings. In 1889 the Italians proclaimed a protectorate over the whole of Abyssinia; but in 1896, after the destruction of an Italian army by Menelik at Adowa, this claim was withdrawn, and Italy confined to the lowlands of Eritrea.

Trade and Towns.—The chief commercial products are gold and coffee, but the trade of the country is at present unimportant.

The present capital is *Addis Halem*, but the position is periodically changed when the supply of firewood is exhausted. Of the old towns the most important are *Gondar*, the capital of Amhara, *Adowa*, the chief town of Tigré, *Aksum*, the former ecclesiastical centre, and *Harrar*, an important trade centre near the Somali frontier.

ERITREA

Eritrea, or Erythræa, a term derived from the classical name of the Red Sea, is the Italian protectorate at the south-western end of the Red Sea. It is a triangular tract of lowland which extends along the Red Sea from Ras Kasar (18° N.) to the frontier of the French Somali Coast (12° N.), and stretches westward to the scarp of the Abyssinian plateau. Most of Eritrea is a barren, sandy plain, which in places sinks below sea-level. The best harbour and only important town is *Massowa*, situated on a small coral island connected with the mainland by a causeway. From Massôwa two short railways run westward across the coast plain to the foot of the Abyssinian hills. The only important natural products are salt, derived from a number of dried lakes and lagoons, and pearls which are fished on the Dhalac Islands near Massowa. Salt is valuable as the principal currency of southern Abyssinia.

Eritrea is mainly inhabited by Hamitic races, of which the most important tribe is the Danakil. Italian political connection with Eritrea began in 1880, when Assab was transferred from a trading company to the Italian Government. Massowa was occupied in 1885 on the withdrawal of the Egyptian garrison. By subsequent treaties the whole of Eritrea was annexed and a protectorate proclaimed over Abyssinia. But after the Italian defeat at Adowa the independence of Abyssinia was recognised, and the Italian sphere limited to the arid coast plains. Except as a trade route to Abyssinia, Kassala and the Atbara region of the Sudan, the country is of little value, and most of the Abyssinian trade is now being transferred to the French port of Jibuti.

FRENCH SOMALI COAST[1]

French Somaliland.—The old harbour of Obok, opposite Aden, at the entrance of the Red Sea, has been superseded since 1896 by *Jibuti* in a better situation on the south side of the Bay of Tajura. These coast

[1] By M. Zimmermann.

stations have been augmented by a hinterland which forms the Protectorate of the Somali Coast. It acquires considerable importance, not only from its position, but from its proximity to Harrar, in Abyssinia, and from the railway which has been commenced from Jibuti to Addis Abeba, the capital of that country.

SOMALILAND

Somaliland.—The "Eastern Horn of Africa," which projects into the Indian Ocean on the south side of the Gulf of Aden, is occupied by the Somali tribes, and is accordingly known as Somaliland. The country faces the north with a steep scarp running east and west from Cape Guardafui to near Harrar. East of Berbera the scarp is separated from the shore by a narrow belt of coastal plain and a few foot-hills. But west of Berbera the coastal plain widens owing to the northward advance of the coast. At the summit of the scarp a broad plateau slopes gently to the south; on its northern border is a belt of waterless desert, the Haud. The southern slope leads down to the Webi Shebeyli, separated from which by a scrub-covered plain is the River Jub, which divides Somaliland from British East Africa.

The natives are mainly Somali, a Hamitic race of Mohammedans. They are a pastoral, nomadic people, and have herds of camels, cattle, sheep, and horses. Along the Webi Shebeyli are some Bantu tribes of Negroes, while some Galla remain along the southern and western frontiers.

The northern coast as far as 49° E. is a British protectorate under the Foreign Office. The British sphere extends inland to the 8th parallel of N. lat. The rest of the country was an Italian protectorate; but since 1896 Abyssinia claims a large share of Somaliland. By the treaty of Addis Abeba in 1896 the Italian sphere was limited to a strip 180 miles wide along the coast; by a treaty with the United Kingdom in 1897, some 8,000 square miles of British Somaliland were ceded to the Abyssinians, who now possess all except the two coast protectorates.

The principal towns in British Somaliland are *Berbera*, opposite Aden, *Bulhar*, and *Zaila*, of which the last is an important starting-place of caravans for southern Abyssinia. Along the Italian or Benadir coast of Somaliland the chief towns are *Mogadishu*, *Barawa* and *Merka*. The Italian administration has its seat at the new settlement of *Itala*, about 100 miles north-east of Mogadishu.

The principal exports from Somaliland are ivory, gums, hides and spices.

SOKOTRA

Sokotra is geographically and geologically a dependency of Somaliland, from the eastern promontory of which it is 150 miles distant. Some smaller islands, the Brothers, help to link Sokotra to the mainland.

The island of Sokotra has an area of about 1,500 square miles, with a population of probably about 10,000. Most of the island is a plateau about

800 feet high, but it is traversed by a mountain ridge of which the peaks rise to a height of over 4,000 feet. The natives are mainly descendants of immigrants from southern Arabia and of fugitive Negro slaves. The natives were once converted to Christianity by Portuguese missionaries, but have returned to Mohammedanism. Since 1886 the island has been a British possession. The capital is *Tamarida*, a village on the north coast. The trade is insignificant.

BRITISH EAST AFRICA

Surface.—British East Africa is the largest of the political divisions of Eastern Equatorial Africa. It extends from the coast of the Indian Ocean to the Congo Free State, and from German East Africa to an undelimited frontier on the north. Its general configuration is comparatively simple. It may be regarded as consisting of a series of zones, approximately parallel to the coast. First is the low coastal plain, fringed with islands formed by beds of coral limestone or of alluvial deposits, separated from the mainland by a series of branching creeks and backwaters. The coastal plain is narrow opposite Mombasa, but in the valleys of the Sabaki and Tana it is of considerable width. From the coastal plain a steep slope leads up to the inland plateau, a broad tract of undulating barren country known as the Nyika; it is covered with acacia scrub, has no turf, and is in the main waterless. West of the Nyika extend the grassy plains of the volcanic region. The Eastern or Eritrean rift-valley cuts across this from south to north, lowering a belt of country now occupied by a series of lakes and rivers without outlets to the sea. Beyond the western wall of the Eritrean rift-valley there is a gradual slope downward to the Victoria Nyanza basin and the valley of the Nile.

FIG. 446.—*Mombasa Harbour.*

People and History.—The coast lands and off-lying islands of British East Africa were once occupied by independent Bantu tribes. Arab, Baluchi, and Hindu traders settled along the coast at different points at an early period, and they held their stations without foreign interference until the arrival of the Portuguese at the end of the fifteenth century. The Portuguese erected forts at Mombasa, Melindi and Lamu and held the country as an intermediate station on the way to India. With the downfall of the Portuguese empire in India the East African colonies became less important, and the coast north of Moçambique again fell under the Arabs, who had maintained throughout their rule in Zanzibar. British intervention began in 1824 by the temporary annexation of Mombasa, an act, however, repudiated by the home government. In 1879 the Sultan of Zanzibar offered the United Kingdom a protectorate over his dominions, which was declined. Germany in 1884 acquired a

foothold on the coast opposite Zanzibar, and a protectorate over Witu, in and near the Tana delta, in 1885. The United Kingdom, in reply, occupied Mombasa, and accepted administrative rights over the Sultan of Zanzibar's territory on the mainland, which was entrusted by charter to the British East Africa Company in 1888. This company sent numerous exploring expeditions through the country, established stations, and occupied Uganda. Exhausted by these expensive efforts it handed over the administration of the country to the Crown in 1895, and since that time it has been ruled by the Foreign Office. The trade as yet is small; the imports in 1901–2 amounted to £421,000, mainly piece-goods and food supplies.

FIG. 447.—*The Badge of British East Africa.*

The country now forms two divisions, the East Africa Protectorate, which extends from the coast to the north-west shores of the Victoria Nyanza, and the Uganda Protectorate which extends westward to the western lakes and the Nile.

The **British East Africa Protectorate** is divided into seven provinces: the Coast Province, Ukamba, Tanaland, Jubaland, Kenya, Naivasha, and Kisumu. Jubaland is imperfectly explored and its boundaries indefinite; but the main features of most of the rest are known.

The **Uganda Protectorate** includes Uganda proper, which lies at the north-western corner of the Victoria Nyanza, and the adjacent countries of Unyoro, Usoga, part of Kavirondo, Koki and Ankole. The southern, south-western, and south-eastern boundaries are defined, but to the north the limits are still indefinite on the side of the Anglo-Egyptian Sudan, which includes the Bahr-el-Ghazal and all the lowlands between the Abyssinian highlands and the Nile. Uganda is a small country with a population estimated at about 300,000, which has probably diminished during the past twenty years. The country is not very healthy, but its strategic importance is great. A band of Wahuma invaded the country from the north-east, settled and intermarried with the original Bantu people. As a result of this mixture of races the Waganda are of unusual intelligence. The country was first visited by Speke and Grant in 1862, and by Sir Samuel Baker in 1864. Stanley reached Uganda in 1875–6, and called attention to its political importance. It was taken under the protection of the British East Africa Company in 1889; after a severe struggle the British supremacy was maintained by Lugard in 1892, and in 1894 the country was taken over by the British Government. A railway, completed in 1902, now connects the Victoria Nyanza with the coast at Mombasa, and this makes it possible to test the economic value of Uganda; the cost of transport by caravans of porters being £300 a ton no development was formerly possible.

The Protectorate has been divided into the Central, Uganda, Western, Nile, and Rudolf provinces. The native capital of Uganda is *Mengo*, and the

British headquarters at *Entebbe*, on a point running into the lake. There is little game in the country, and the main food of the natives is the banana.

ZANZIBAR AND PEMBA

Zanzibar Island lies thirty miles off the coast of German East Africa in lat. 6° S. It consists of layers of sand and clay associated with banks of coral limestone ; most of it is low-lying, but in the north some hills rise to the height of about 1,000 feet. The soil is fertile, and nearly the whole island is cultivated ; cloves and coco-nuts are the two chief products. The population is dense. The natives are extremely mixed in race, members of all the East African tribes having been imported as slaves ; they have intermarried among themselves and with Arabs, Persians and Baluchi traders. A few of the original Bantu inhabitants are represented by some settlements of Wahadimu in the north of the island. The name *Zanzibar*, which means "the land of the black," is also given to the chief town, which is situated on the south side of a bay on the west coast, and is the principal commercial centre in Equatorial Africa. Its imports in 1901 were worth £1,196,000, and its exports £1,168,000.

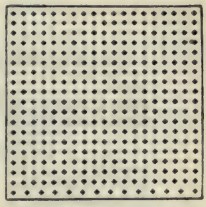

FIG. 448.—*Average population of a square mile of Zanzibar.*

The importance of Zanzibar has arisen from its early adoption by the Arabs as the capital of their East African settlements. The Sultanate was long subject to the Imans of Muscat, but it became independent in 1856. Until 1884 the Sultan was the acknowledged ruler of the East African coast lands from Moçambique to Somaliland. In 1884 the southern part of his mainland territory was acquired from him by Germany. In 1890 a British protectorate was formally proclaimed over the remainder. The Benadir coast, *i.e.*, the eastern coast of Somaliland, was, however, transferred to the protection of Italy. At present the Sultan of Zanzibar theoretically rules the coast belt of British East Africa, but practically this is administered from Mombasa, and is treated as an essential part of the British sphere.

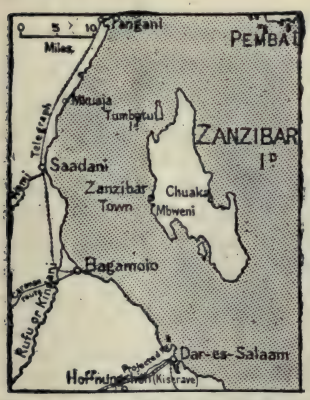

FIG. 449.—*Zanzibar and mainland ports.*

Pemba.—The adjacent island of Pemba is 40 miles north of Zanzibar, and is under the jurisdiction of the Sultan. It is 40 miles in length, running parallel with the coast of the mainland, at a distance of 60 miles, from Pangani to Tanga. The soil is fertile, and the population consists mainly of

slaves and freed slaves engaged in the clove and coco-nut plantations. The basis of the island appears to consist of lines of raised coral reef. The chief town is *Chaki-Chaki*, situated on the east coast. The language of the aboriginal inhabitants, or Wapemba, is a dialect of Suahili.

STATISTICS

(*Estimates.*)

	Area in sq. miles.	Population.	Density of Population per sq. mile.
Abyssinia (excluding Somali territories)	300,000	5,000,000	17
Eritrea	88,000	400,000	4
French Somali Coast	8,600	30,000	3
Somaliland, British	68,000		
„ Italian	136,000	2,000,000	7
„ Claimed by Abyssinia	100,000		
Sokotra	1,500	10,000	7
British East Africa	350,000	5,000,000	14
Zanzibar	625	200,000	320
Pemba	360	90,000	250

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II.—GERMAN EAST AFRICA

By Graf von Pfeil.

Surface and Configuration.—The coast of German East Africa (*Deutsch Ost-Afrika*), about 620 miles long, shows little morphological development, but is not destitute of excellent harbours, Tanga, Kilwa Kisiwani, Lindi, Mikindani, and the best and principal harbour, Dar-es-Salaam, deserve special mention. They all owe their origin to small rivers whose discharge of fresh water caused a break in the growth of the coral which built up this coast. Three islands of fair size, Pemba, Zanzibar, and Mafia, show by the rocks of which they are composed that they once formed part of that zone of coral limestone which, together with clay schists and sedimentary deposits, forms a coastal plain of about 10 to 30 miles in width. South of the Rufiji, this plain, gradually rising, extends towards the mountains on the eastern side of Lake Nyasa. West of the coast-land the high plateau is composed of ancient rocks, gneiss and mica-schists; near the northern end of Lake Nyasa Carboniferous sandstone runs in a southerly direction towards the Rovuma river, near which coal seams have been discovered. Igneous rocks, basalt, trachyte, andesite, occur in the northern part of the protectorate between Kiliman-

jaro and the Victoria Nyanza. The great Unyamwezi plateau is simply composed of granite. In some spots lacustrine deposits are found. In a vertical sense East Africa shows comparatively little development. Along its western border extends the continuation of the great western rift-valley. The vast territory situated between it and the Indian Ocean may be broadly characterised as a tableland. To understand its configuration we might picture to ourselves that it was suddenly rent open in a direction nearly parallel to the coast. The cleft thus supposed to be produced is called the Eritrean rift-valley, and it divides the plateau into two parts, each of which has been considerably disturbed from its original level. The western portion retained its old height in the north, while the western side and southern end subsided ; the eastern, and much narrower part of the plateau, retained its elevation along its western border, while the eastern side and southern end were probably tilted up. By whatever Earth movements the present configuration of the country was brought about, the result is to give the country its greatest elevation in the region north of Lake Nyasa, where an altitude of about 9,000 feet is attained by the highest peak. The average level of the plateau lies between 3,000 and 4,000 feet. The sides of the rift-valley are precipitous, so is the drop of the tableland on the east side where it presents the appearance of a tall mountain range when seen from the low coastal plain. Where the Eritrean rift-valley crosses the northern boundary of German territory the volcanic forces, which opened all the rents radiating from this spot, seem to have had their seat. From a rift which branches off in an easterly direction, Mount Kilimanjaro rises, towering to an altitude of 19,200 feet. From its extinct crater an immense glacier descends, from which the Pangani river derives its chief water supply. A longer rift called the Wemberre, extends in an opposite direction ; its northern portion is occupied by a shallow lake, and several smaller lakes are situated in the neighbouring main rift. South-east of Kilimanjaro the mountains of Pare and Usambara rise abruptly from the plains, a narrow strip of which separates them. They approach much nearer the coast than any other mountainous part of East Africa, and they are but loosely connected through the mountains of Nguru with the central Plateau. The Pare and Usambara mountains are covered with tall primeval forest. A similar isolated group of mountains rises in the more southern district of Ukami.

Hydrography.—The country east of the great fissure sends its drainage to the Indian Ocean. The Pangani is the channel through which Kilimanjaro and the Pare and Usambara mountains discharge the rainfall which they receive partly from the south-east monsoon. The Wami rises in the mountainous plateau border, while the Kingani, rising in the Ukami mountains, belongs entirely to the littoral region. Only the Rufiji-Ruaha has its origin on the plateau, its great tributaries, the Ulanga and the Rovuma, have their sources at the foot of the mountains east of Lake Nyasa. The Pangani is navigable for about 12 to 18 miles the Rufiji for

more than 60 miles in its lower course, and its tributary, the Ulanga, for a considerably longer distance. The plateau west of the fissure, much drier than its eastern portion, sends its water through the Malagarazi river to Lake Tanganyika, and thence to the Atlantic. The northern portion of German East Africa, sending amongst other and smaller rivers the Kagera to the Victoria Nyanza, becomes tributary to the Nile. Lakes Tanganyika and Nyasa fill the deepest parts of the western rift-valley while Lake Rukwa is only a huge swamp formed by the collection of local waters in a subsidiary rift, which to some extent links together the disconnected portions of the main rift.

Climate, Flora and Fauna.—The climate of East Africa is influenced by the monsoons; the wet and dry seasons are well marked, but occur at different times of the year in different parts of the country. On the coast a high temperature prevails subject to little change, with corresponding moisture of the air. The mountainous regions enjoy a more temperate climate with sometimes decidedly cool mornings and evenings. The plateau has a more continental climate with frequent hot winds. Malaria occurs often, but rarely in a serious form where the comforts of a civilised mode of life are available. The vegetation of East Africa varies according to the degree of moisture contained in air and soil. Where rivers or monsoons supply moisture dense forests cover mountain side and river bank. On the coast many useful plants and trees from India, such as the mango tree, flourish, while coco-nut and other palms are common. The river mouths are mostly fringed with dense growth of mangrove. The plateau has a steppe character: on it various kinds of mimosa and the baobab occur; grassy plains are also met with, and the Marenga Mkali and Magunda Mkali are arid deserts with next to no vegetation. The fauna is very interesting through the varieties of antelope which swarm on the plateau in great numbers. Giraffe and buffalo, and, with the exception of the elephant, most pachyderms are still plentiful, so are lions and other beasts of prey. Nearly all the rivers harbour a wealth of fish and many crocodiles. Birds are numerous, but only a few are notable for brilliant plumage; amongst running birds the ostrich stands foremost. Of insects ants deserve special notice. The white ant is a common plague of settlers, and the so-called "siafu" wander everywhere in millions acting as scavengers. The tsetse fly, which brings death to most domestic animals, infests certain localities of the country. Locusts have repeatedly appeared.

People and Trade.—The population of East Africa belongs chiefly to the Bantu race, which in its migration from the south met the advance of Hamitic and Nilotic tribes coming from the north. The Bantu race is best represented by the tribes round Lake Nyasa, the Hamitic element by the Masai near Kilimanjaro. On the coast live the Suahili of mixed origin, who are remarkable for a degree of Asiatic culture and the fact that they have been able to impress a knowledge of their language upon almost all the tribes of the interior. These native tribes are

mostly ruled by despotic chiefs, though small self-governing communities are not uncommon. Many tribes, especially those on the grass lands, rear cattle, but only a few are truly nomads. Nearly all till the soil with iron hoes of their own manufacture. Their productions—ground-nuts (*arachis*), maize, rice, sesame, beans, &c., together with those they collect in the forest, rubber, copal, fibres, lichens, &c., are exported in yearly increasing quantities. Of industry they possess little ; unable to produce textiles beyond a small attempt on the coast, they in some parts work a fine bark into cloth. Almost everywhere they smelt iron, and forge fine spear-heads. Pottery and wood-carving are much practised. Payable minerals have not been discovered. There is little intertribal trade ; people from the interior, chiefly Wanyamwezi, travel in caravans to the coast, where they barter their produce for European goods. The staple article of trade is calico from Indian and American looms. The sale of guns, ammunition and spirituous liquors is subjected to severe control. Coast trade is chiefly in the hands of Indians, while European enterprise is mainly directed towards plantations, on which only free labour is employed. Slave dealing has been made a penal crime. A special coin of rupee value has been introduced, but the old silver dollar is generally used as a basis of calculation where the use of coin has superseded the practice of barter, which is still nearly universal.

Government.—East Africa was acquired by private enterprise in November and December, 1884, when treaties were concluded with influential chiefs which were sanctioned by the German Government in February, 1885. The colony is administrated by a Governor with a deputy, who is also commander of the forces. Each department of administration is under the charge of a separate officer. Justice is administered in two law courts, one in the Northern the other in the Southern Division. The governor, with the assistance of a judge, presides over an appeal court. The colony is divided into six coast divisions, and ten station districts in the interior, all under responsible officers, whose chief duty is to maintain order in, and amicable relations with the natives of, their districts. They are supported by a police force. A regular four-weekly mail service exists between Germany and the colony, in which a number of post-offices provide for postal communication. No less than ten missionary societies endeavour to spread culture amongst the natives—six of these are German, three English, one French ; seven of them are Protestant, and three Roman Catholic.

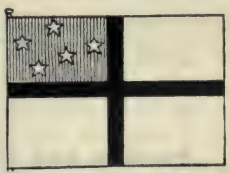

FIG. 450.—*The Flag of German East Africa.*

Some of the coast settlements quite merit the appellation of "town," although less than a decade ago hardly any one of them contained a habitable house. Now all government and most private buildings are handsome edifices ; those of military character are built very substantially of coral blocks, and are capable of withstanding a siege. Private houses

are constructed of lighter material, but are replete with all the comfort which a thorough study of the climate can suggest. Foremost, with regard to its appearance as in all other respects, stands *Dar-es-Salaam*, which is probably the best harbour on the whole east coast of Africa. On entering the bay the eye is at once struck with the air of tidiness which pervades the place. All round the bay runs a broad street flanked on one side by handsome public buildings, all fronting the water. The Governor's sumptuous residence stands in the midst of large gardens where many plants are reared on trial. A number of deep wells supply the town with good water for drinking, and since they have been dug a neighbouring swamp has been drained, so that it has become not only a handsome but also a healthy tropical town.

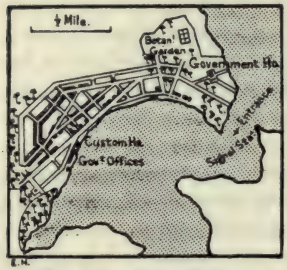

FIG. 451.—*Dar-es-Salaam.*

STANDARD BOOKS.

F. Stuhlmann. "Mit Emin Pascha im Herz von Afrika." Berlin, 1894.
O. Baumann. "Usambara." Berlin, 1891.
——— "Durch Massailand." Berlin, 1894.
P. Reichardt. "Deutsch Ost Africa." Leipzig, 1892.
F. Fülleborn. "Das Deutsche Njassa- und Ruwuma-Gebiet." Berlin, 1906.

III.—PORTUGUESE EAST AFRICA

BY CAPTAIN ERNESTO DE VASCONCELLOS,[1]
Portuguese Royal Navy.

Position and Extent.—The Portuguese possessions in East Africa, formerly known in their entirety as Moçambique (or Mozambique), stretch along the coast from the Rovuma, 10½° S., to a short distance south of Delagoa Bay, almost in 27° S., with a coast-line of 1,400 miles. In the north the coast is much indented with many islands lying off it, and in the south it is low, beset with sandbanks and bordered by many sand-hills and lagoons. The most inland point in the Possession is Zumbo on the Zambezi, 450 miles from the sea, and Moçambique includes the eastern shores of Lake Shirwa and Lake Nyasa.

Surface.—The Zambezi, which forms a great delta on the coast, divides the country into two nearly equal parts, to the north the province of Moçambique, to the south that of Lourenço Marques. North of the Zambezi granitic formations give rise to a mountainous country, in which the Namuli mountains rise to 8,800 feet, and form a sort of hydrographic centre whence flow the rivers Likungu southwards, Ligonia eastwards, and Lurio north-eastwards. Mount Mlanje south of Lake Shirwa, and the Serra

[1] Translated from the Portuguese.

Morumbala, which reaches 4,000 feet, may also be mentioned; but there are other important elements of the orography which space makes it impossible to enumerate.

South of the Zambezi the Serra da Gorongoza rises to 6,500 feet, sending its waters to the Zambezi and Pungwe, and the edge of the so-called Manika plateau runs southward, with Mount Doe rising to 7,900 feet. In the south the well-marked Libombo Range separates the Lourenço Marques district from the Transvaal. There are numerous rivers, many of which are navigable by light-draught vessels. The Limpopo, Save, and Pungwe are the most important in the south. The Zambezi, however, is the greatest waterway in East Africa, approached from the sea either through the winding Quelimane branch, or the shorter and deeper Chinde mouth. Its tributary, the Shire, coming from Lake Nyasa, is also navigable.

Climate and Resources.—According to the latitude, there are varieties of climate; but generally the low coastal plain is malarious and unhealthy owing to inundations from the rivers and the formation of swamps. In the interior, where the effects of latitude are corrected by altitude, the climate is bearable and sometimes good. Farther south, in the part beyond the tropic including Inhambane and Lourenço Marques, the climate is generally better adapted to Europeans. The mean temperature in Lourenço Marques is about 75° F., but the minimum falls sometimes below 65°.

The products are almost entirely derived from the forests; oleaginous seeds, wax, gums, orchil, coffee, tobacco, and ivory being the chief.

People and Government.—The population is made up of various races and tribes. In the north, between the Rovuma and Angoche rivers, the Makwa people dwell, and farther in the interior the Ajaus, both belonging to the eastern branch of the great Bantu race. In the ancient Tete district are found the Maraves, Sengas, and other tribes; south of the Pungwe the Vatwa race inhabits Gazaland. The Portuguese call the various races living near Inhambane, who have adopted the manners and customs of the Vatwas or Manguni, *Ladins;* the Tongas are people of an inferior race living on the banks of the Motamba and around Inhambane.

The colonial province forms a Governor-Generalship, and is divided into the districts of Moçambique, Lourenço Marques, Inhambane and Zambezia. A great part of its territories is under the administration of chartered companies; the Nyasa Company is supreme between Lake Nyasa and the Rovuma; the Moçambique Company is developing the gold and other resources of Sofala and Manika; and the Zambezia district is managed by the Company of the same name, but without sovereign rights

Towns and Trade.—The most active commercial town is *Lourenço*

Marques, on the large and safe harbour of Delagoa Bay in the south. Its importance rests on the railway which runs for 57 miles through Portuguese territory before entering the Transvaal, and thus forms the shortest outlet for that colony to the sea. *Beira*, at the mouth of the Pungwe, is somewhat similarly situated, the head of navigation on the river being connected by railway with Salisbury in Southern Rhodesia, forming the shortest route to that place from the sea. *Chinde*, on the Zambezi delta, and *Quelimane* have been developed by the transport trade on that river. The old capital, *Moçambique*, situated farther north on an island near the coast, has not profited so much by the recent development. Portuguese East Africa does not as yet carry on much trade with the mother country. The commerce of its ports consists mainly of goods in transit, and takes place chiefly with the United Kingdom, India, France and Germany.

FIG. 452.—*Delagoa Bay.*

STATISTICS (*approximate*).

Area of Portuguese East Africa in square miles	301,160
Population „ „ „	3,120,000
Density of population per square mile	10
Population of Moçambique	8,000
„ Lourenço Marques	7,700

IV.—BRITISH CENTRAL AFRICA

BY SIR HARRY H. JOHNSTON, G.C.M.G., K.C.B.,

Formerly Commissioner and Consul-General administering British Central Africa.

Position and Boundaries.—British Central Africa is the name given officially to the large territory under British protection in South Central Africa, to the north of the Zambezi. This designation is, on the whole, the most correct and the most comprehensive, and is that recognised by the Foreign Office, which controls the administration of this territory. Portions of British Central Africa, however, are sometimes styled Northern Zambezia, or Northern Rhodesia, and Nyasaland.

British Central Africa includes within its limits almost the whole northern watershed of the river Zambezi and its affluents; it further extends to the Lualaba or Upper Congo (which river rises within this territory); to the southern shores of Lake Tanganyika; to the western and eastern shores of Lake Nyasa; and to the eastern shores of Lake Chilwa. It covers the whole of Lake Bangweolo, and a large part of Lake Mweru within its limits. Further, it may be said that it is bounded on the north by the Congo Free State, on the north-east by German East Africa, on the south-east by Portuguese East Africa, on the south by the Zambezi, and on the west by Portuguese West Africa.

Configuration.—The physical configuration is that of a vast plateau, deeply cut into on the east by the trench of Lake Nyasa (Lake Tanganyika on the north continuing the line of this remarkable rift), and worn down southwards into the valleys of the Shire, Luangwa, Kafue, and Zambezi. Its principal rivers are the Zambezi,[1] the Shire (the next in importance politically, though not as regards length of course), the Kafue, the Luangwa, the Kabompo, and the Lungo-e-Bungo. All of these belong to the Zambezi system, and have innumerable affluents of their own. The rivers joining the Congo system which flow through British Central Africa are, amongst others, the Chambezi, the Luapula, the Lohombo, and the Kalungwisi. The river Saisi, which rises in the north of British Central Africa, is the principal affluent of the salt Lake Rukwa, which lies beyond the territory. The lakes of British Central Africa are: Tanganyika, Nyasa, Bangweolo, Mweru, Moir Lake, the Mweru Salt Swamp, and Lake Chilwa. The two last are salt lakes; but there is a tendency in Tanganyika and Mweru towards brackishness. The only great lakes, veritable inland fresh water seas of great antiquity and relatively unchanged in area, are Tanganyika and Nyasa. Lakes Bangweolo and Mweru are shallow depressions which the Upper Congo has turned into lakes of varying extent. Lake Chilwa is likewise shallow and swampy, and is possibly a former gulf of Lake Nyasa cut off by the upheaval of a low ridge of ground. Lake Tanganyika possesses actually a marine fauna, and it has been conjectured consequently that it is the relic of a former extension of the ocean into the heart of Africa in the Cretaceous period. Lake Nyasa is a curiously formed trench dug into the central African plateau, as though a gigantic spade had been driven eastward into the tableland at a slant, digging deep down on one side, and throwing up the ground on the other into the form of the Livingstone Mountains. The western shore of Lake Nyasa is shallow, but it deepens towards the east coast, where its depths are so profound that they are in many places much below the surface of the Indian Ocean. Immediately above these great depths along the east coast rise the precipitous Livingstone Mountains, attaining heights of from 5,000 to 10,000 feet. The water of Lake Nyasa is absolutely fresh, and its fauna has no signs of marine origin. Tanganyika drains intermittently into the Upper Congo by the river Lukuga; Lake Nyasa drains into the Zambezi by the Shire river, and, but for an interval of sixty miles of rapids, is in direct water communication with the Indian Ocean. The tableland of British Central Africa is tortured here and there by Earth movements or by atmospheric agencies into lumps and ridges and tilts which are styled mountains. So far as is yet known, the highest altitude is attained at the extreme south-

[1] The name of this great river is relatively constant from near its source to its mouth, and appears to be derived from an old root—*mbiji* or *mbizi*, which in many Bantu languages means *fish* or *meat*—though this resemblance may be accidental. Preceded by various prefixes the name of the river may appear as Liambiye, Liambiji, Diambizi, Dombazi, Dzambezi, Zambezi; but on the whole Zambezi, besides being long since sanctioned by custom, is the most generally recognised native name.

eastern corner of the territory by the beautiful mountain of Mlanje, an isolated block of tableland which has given rise to a series of volcanic craters that further add to its height. The highest point of Mlanje is 9,683 feet. Along the western versant of Lake Nyasa the tableland occasionally tops altitudes of 7,000 and 8,000 feet. An altitude of 7,000 feet is occasionally reached by points on the Nyasa-Tanganyika Plateau and in the mountains to the south of Lake Bangweolo.

Geology.—The geology of British Central Africa appears relatively simple. The commonest formation, perhaps, is a mixture of metamorphic rocks, grauwacke, clay, slates, gneiss and schists. The principal mountain ranges consist mostly of granite; and granite with its upper layers often rotten, and even turned into red ferruginous clay, constitutes the surface soil of most of the highlands. There is an outcrop of sandstone on the north-west and north-east coasts of Lake Nyasa and west of the river Shire, at the south end of Tanganyika, round about Lake Mweru, and in the countries adjoining the river Luapula. Volcanic lavas and tuffs are present on the upper plateau of Mlanje and at the north end of Lake Nyasa. There is a good deal of quartz in the mountains to the west of Lake Nyasa. The low flat hills in the upper Shire district and on the north-west coast of Lake Nyasa are composed of marble. The valleys of the Luangwa and the upper Zambezi are covered with alluvial soil. Gold has been found to the west of Lake Nyasa, and is probably present in the Shire highlands. It is found in some abundance in the valleys of the streams which flow into the central Zambezi. Iron is found nearly everywhere except in the alluvial river valleys. Copper exists in the Luapula basin, graphite has been found in Nyasaland, and deposits of coal are present in most of the sandstone formations. The average annual rainfall is about forty inches. The climate on all the plateaux is very agreeable. It is not the climate which causes ill health, but the rank soil, which requires to be chastened by many years of tillage before the country is fitted for permanent settlement.

Flora and Fauna.—The whole of this area is covered with fairly abundant vegetation, in some places reaching typical tropical luxuriance. Nearly all the more important or valuable trees of tropical Africa are represented, and there are five species of indigenous palms, including the oil-palm of West Africa, which extends its range to the west coast of Lake Nyasa. There are four kinds of rubber produced in the forests, and a valuable article of export is the *strophanthus* drug. A notable feature in the flora of British Central Africa is the possession of two species of conifer found growing on Mount Mlanje, and possibly on a few peaks to the north. These are the only conifers known to exist in tropical Africa with the exception of those found on the mountains of Abyssinia and Mount Kenia. One of these conifers is the *Widdringtonia whytei*, a tree resembling the cedar in appearance, but really related to the cypresses.

The fauna of British Central Africa is that of typical tropical Africa.

It possesses some West African species, but several forms characteristic of South Africa and the Sudan are absent, such as the ostrich, any species of oryx antelope, the aard-wolf, all mountain zebras, and the secretary vulture. The mass of African antelopes is abundantly represented — especially notable in numbers are the sable antelope, the eland, the kudu, the pallah, the hartebeest, and the water-buck. The African elephant is still found in considerable numbers, and so is the rhinoceros. The low-lying parts of the territory are infested with the tsetse fly, which there renders impossible the keeping of horses and cattle; but this pest is quite absent from the highlands, and moreover tends to diminish in the low country as human settlement increases.

People.—The native inhabitants belong entirely to the negro stock, and to that section of it which speaks Bantu languages. There is, however, not much correlation between race and language where the Bantu negroes are concerned, and the inhabitants of British Central Africa evidently arise from a fusing of three negro stocks: the east coast negro, physically more akin to the tribes of the Eastern Sudan; the west coast negro (the extreme development of the negro type); and an underlying stratum of the Bushman or pygmy race, which undoubtedly inhabited the country before it was invaded by the big black negroes from the north. The tremendous race disturbances in South Africa in the early part of the nineteenth century sent north-west across the Zambezi a Zulu invasion. The invaders were akin to the Matabele, but were known as Angoni. These Angoni constituted a ruling caste in the centre of the territory between Lake Nyasa and the river Luangwa. Similarly Barutseland, on the upper Zambezi, was invaded by Bechuana; though later on the indigenous race expelled its Bechuana rulers and set up a dynasty of its own. The most important people of Nyasaland are the Yao, invaders from the east, who with the aid of the Arabs would have conquered all Nyasaland but for the intervention of the British. They are physically a very fine race, with an undoubted future before them. The inhabitants of Nyasaland proper are the Anyanja, a stock which furnishes the native tribes of all but northern Nyasaland, and of the whole lower Zambezi. The Barutse and kindred tribes are connected linguistically with the people of Lower Guinea and the Congo basin rather than with the inhabitants of the eastern half of this territory, who in language approximate more to the Zanzibar group. The various tribes dwelling round the north end of Lake Nyasa and the south end of Tanganyika and Lake Bangweolo, speak languages which are remarkable for their archaic form and their approximation to the original mother tongue of the Bantu. The entire native population of this vast territory probably does not exceed three millions. Before the arrival of the Angoni and other recent invaders, there were a few great chiefs of ancient lineage, but these are now all swept away or much reduced in power. The only chief of any importance and independence is the king of the Barutse. In the middle of the nineteenth century

the eastern part of British Central Africa was invaded by Arabs and half-caste Arabs from Zanzibar, who, but for their quarrel with the British and consequent defeat, would have succeeded in founding powerful Arab sultanates round Tanganyika and Nyasa. Very few Arabs now remain in the territory.

Government and Trade.—The whole of British Central Africa was brought under British protection between 1889 and 1891. The Chartered Company of South Africa shared in the task, and has been assigned the central portion of British Central Africa as a sphere for its administration, Barutseland remaining under the intelligent rule of its enlightened chief, and the eastern part of the territory, where Europeans were chiefly settled, being controlled by a direct Imperial administration working under the Foreign Office. Little or no commerce at present exists in any other part of the protectorate but the last named. Here the trade amounts to an annual value of nearly $750,000. The main staple of export trade is coffee. The coffee-tree was introduced by Scottish planters in 1876; the parent tree coming from the Botanical Gardens in Edinburgh. The coffee grown in British Central Africa is equal to the finest Mocha, and attains practically the same prices on the London market. The output of coffee from the infant plantations in 1897 was about 450 tons, and the coffee-plant has been adopted as the colonial badge. Other articles of export are ivory, gold, *strophanthus* drug, rubber, rhinoceros horns, wax and hides. The system of internal communications is mainly along the natural waterways. The country is ordinarily entered by the Zambezi at the town of Chinde on the Indian Ocean. The Zambezi is navigable all the year round as far as its confluence with the Shire, and the Shire is likewise navigable all the year round as far as Chiromo. From this point roads, more or less carriageable, have been constructed to Lake Nyasa, and a railway is in contemplation. Lake Nyasa is navigated by several commercial steamers, and is patrolled by three British gunboats. There are one British steamer and several British sailing vessels on Lake Tanganyika. The British South Africa Company has sailing boats on Lake Mweru. Elsewhere off this main line of road the only means of communication are the native paths, which criss-cross the country in all directions. Transport along these routes is effected by native porterage. A telegraph line from South Africa passes through the British Central Africa, and a railway from Rhodesia reaches far into the interior. There are at present no towns of any size. The largest settlement of Europeans is *Blantyre;* the administrative capital of the Protectorate is *Zomba*.

FIG. 453.—*The Badge of British Central Africa.*

General Character and Statistics.—The essential characteristics of British Central Africa are those of a great tropical dependency, which may in time become peopled by many millions of black men, but which

is not suited any more than India for European colonisation. Europeans can maintain fair health on the more elevated districts, but the country is emphatically not one where the European can make a permanent home or be anything more than a temporary settler as planter or trader. The country as a whole is unhealthy ; but as money is made very quickly over coffee planting, and as there are considerable gold mining prospects the European immigrants slowly increase. The entire European population in the year 1898 scarcely exceeded 450 souls, of whom all but a few are British subjects. Nyasaland is celebrated for its thriving settlers of Scottish race, who have been the main agents in bringing this territory within the sphere of British interests. The area of British Central Africa can only be given approximately while the western frontier with Portugal remains unsettled. It may be roughly stated at 300,000 square miles. The average value of the trade with Great Britain at the institution of the Protectorate in 1891 was about $185,000. It has now risen to about $750,000 in annual value. The revenues of the British Central Africa Protectorate during the same period have risen from nil to about $110,000 per annum. The deficit in the cost of administration is met by the Imperial Government. The responsibility and expense of administering the Central Portion of British Central Africa are borne by the Chartered Company. There are eight missionary societies — five British, two French, and one Dutch—at work in this field.

STANDARD BOOKS.

Sir H. H. Johnston. "British Central Africa." London, 1897.
H. Drummond. "Tropical Africa." London, 1888.

CHAPTER LI.—WEST AFRICA

I.—SPANISH WEST AFRICA

By Edward Heawood, M.A.

Canary Islands.—The Canaries are a group of volcanic islands upheaved, between 27° and 30° N., along the north-westerly slope of Africa towards the Atlantic depression. The five principal islands, Lançerote, Fuerteventura, Gran Canaria, Tenerife, and Palma, run in a curved line from east to west, while Gomera and Hierro (Ferro) lie a little off the curve towards the south-west. The moisture brought by the trade winds (especially in winter and to the northern slopes) make the group less barren than the opposite mainland, and the luxuriance of the vegetation increases towards the west; but the plains of basaltic lava are distinctly arid. Perhaps the most characteristic plants are cactus-like Euphorbias. The famous Peak of Tenerife (Pico de Teyde), 12,200 feet high, reaches far above the cloud-belt. The vines, bananas and other fruit trees of the lower slopes give place in turn at higher levels to forests of laurels, oaks and pines; a species of tree-heath and a broom (retama), grasses, and, highest of all, a violet occurs, but all above 10,000 feet is barren. Three different races inhabited the Canaries in ancient times, the best known being the Guanches, probably allied to the Berbers. Known vaguely to the ancients as the Fortunatæ Insulæ, the group was first conquered in 1402 by the Norman De Béthencourt, but in spite of Portuguese efforts to obtain a footing was finally confirmed to Spain in 1479. The chief towns are *Santa Cruz*, in Tenerife, the seat of Government, and *Las Palmas*, in Gran Canaria, whose port, *La Luz*, has been developed as a coaling station for steamers on the South African route. Wines, cochineal, oil, cereals and tobacco are the chief products of the group.

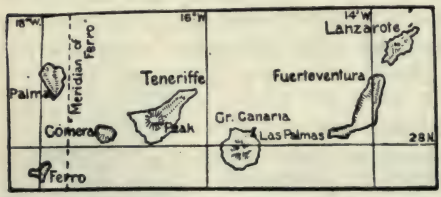

FIG. 454.—*The Canary Islands, showing the assumed meridian of Ferro.*

The meridian of Ferro, the most westerly known land in the days of Ptolemy, was long accepted as the initial meridian for reckoning longitude, and on the discovery of America was the dividing line between the "Eastern" and "Western" hemispheres. In 1634 the meridian was assumed to be exactly 20° west of Paris (17° 39′ 45″ west of Greenwich), and this is still used as the zero of longitude on some maps.

Spanish Sahara.—The Spanish Sahara extends along the west coast of the desert between Capes Blanco and Bojador, with an average width of about 170 miles. It consists of a granite plateau with vegetation only in the depressions, roamed over by predatory nomadic tribes. While the early relations of the Portuguese and other nations with these coasts for the purpose of trade and fishing were confined chiefly to Arguin, south of Cape Blanco, the Spaniards of the Canaries established themselves in 1476 at Santa Cruz de Mar Pequeña, north of that cape, and at other posts, but their fortresses soon fell into ruins. In 1878 they again turned their attention to these coasts, and a protectorate was proclaimed in 1884, but their efforts to obtain a footing in the interior (Adrar) have been without result, that country being recognised as French in 1900. The principal factory is at Rio de Oro, a spot which was known at a very early date, as it is shown on the Catalan map of 1375.

Spanish Guinea.—Spain owns a small area near Corisco Bay, just north of the equator, but the territory is almost valueless for trade, as French expansion has entirely cut it off from the interior.

Fernando Po.—Fernando Po is the largest and the nearest to the coast of the four volcanic islands which run in a south-westerly direction into the Gulf of Guinea in a line with the volcanic peak of Kamerun (Fig. 465). It has roughly the shape of a parallelogram, of which the northern half is almost entirely filled by the great peak of O-Wassa or Santa Isabel (Clarence Peak), 9,350 feet high, an extinct volcano with a still existing crater. It slopes steeply on all sides but the south, where it is joined by a low ridge to the basaltic cordillera which runs east and west through the south of the island. Most of the surface is clothed with dense forest, but there are also some grassy uplands. The native inhabitants are the Bubi, a Bantu tribe. The island was discovered by the Portuguese, but ceded to Spain in 1778. *Santa Isabel*, on the north coast (occupied early in the nineteenth century by Great Britain), is the only town. Some cacao, coffee and cinchona are cultivated, but the climate is unhealthy to Europeans.

Annobon, the last of the four islands, is also the smallest.

STATISTICS.

	Area (square miles)	Population.
Canary Islands	2,900	292,000
Spanish Sahara	70,000	100,000 (?)
Spanish Guinea	9,000	(?)
Fernando Po and Annobon	800	30,000

II.—FRENCH WEST AFRICA

By M. Zimmermann,[1]

Of the "Annales de Géographie," Paris.

History.—The beginning of French influence in West Africa may be traced back to the discoveries of Dieppe sailors on the coast of Senegambia in the fourteenth century. The attractions of the gold of Bambuk and the

[1] Translated from the French by the Editor.

slave trade led to the origin of Gorée, near Cape Verde, and the first attempts at penetrating the interior, particularly those of André Brue from 1697 to 1723; but the real development of French interests only commenced with the able administration of Colonel Faidherbe (1854–1865). He extended the colony of the Senegal from the coast towards the interior and pointed to the upper Niger as the next object of French ambition. In 1866 France possessed only the Atlantic coast from Cape Blanco to Sierra Leone (except Gambia and Portuguese Guinea) as well as the upper Senegal; the vast expansion of this territory has taken place since 1880. As Faidherbe had conquered the Marabout El Haj Omar, his military successors overthrew the Toucouleur empire of Ahmadou by a series of glorious victories, conquered the Almamy Samory, and from 1883 to 1894 pushed the French arms from Bammako, the first post on the upper Niger, to Timbuktu. Thus the colony of the French Sudan was added to those of Senegal and the Southern Rivers (Casamance, Pongo, Mellacorée, &c.). The French rights on the Ivory Coast have been acted upon since 1884, and Dahome was definitely conquered in 1892. All of these colonies, including Dahome since 1902, are combined in the General Government of French West Africa (*Gouvernement général de l'Afrique Occidentale Française*). Since 1895, when, in consequence of the treaty of 1890 with the United Kingdom, France lost all rights to the central Sudan, being confined to the north of a line drawn from Say on the Niger to Barrua on Lake Chad, French exploration and conquest have mainly been directed towards the unknown region lying within the great bend of the Niger and forming the hinterland of the Guinea Coast colonies. The convention of 1898 definitely fixed the British and French positions in the Sudan, modifying the Say-Barrua line to the advantage of France towards Sokoto and Zinder, and moving its starting point down the Niger from Say to Ilo. International rivalry in this region has had at least the one good consequence of a great increase in geographical knowledge. The extent of the equatorial forest and of the bush, the course of the coast rivers Volta, Komoé, Sassandra, Bandama, Kavalle, the course and the characteristics of the Niger itself, are all definitely fixed, and the work of Hourst, Toutée and their fellows, crowns the labours of Mungo Park, Caillié and Barth.

Configuration.—The geology and the relief of French West Africa appear to be fairly simple. As far as the Niger it forms an undulating region of plains or low plateaux diversified occasionally by small granitic areas rising to a greater height. In the bend of the Niger the elevation of 3,500 feet is rarely reached or surpassed; although the peak of Komono, near Kong, reaches 4,600 feet, and that of Hombori, in Masina, is between 2,500 and 3,000 feet. There are no continuous mountain chains; the hypothetical Kong Range has been effaced from the map by the expeditions of Binger, but there are great plateaux of ancient rocks covered with red ferruginous earth or laterite. These play an important part in determining the watersheds of the vast surrounding plains with their gentle and undecided slopes.

By far the most important is the plateau of Futa Jallon in which the Senegal, the Gambia, the Niger, and a multitude of smaller rivers take their rise. It is the great reservoir for the waters of this part of Africa. With a length of about 200 miles from north to south it presents an abrupt face towards the east, and descends in a gentle slope to the Atlantic on the west. The high plains which compose it rarely reach elevations exceeding 2,500 or 3,000 feet; but it is connected with the plateaux and mountains of from 3,000 to 4,000 feet which form the hinterland of Sierra Leone and the Mandingo Mountains east of the Niger. The bend of the Niger contains the plateaux of Sikasso, Kipirsi and Mossi, with elevations of about 2,000 feet, and a great number of scattered highlands. All the rest forms a plain covered with sand or clay, usually red in colour. The great development of Archæan and ferruginous rocks explains the particular richness of all West Africa in gold and iron. Gold has been produced from a very ancient time in Bambuk, on the Faleme, and in Wangara; and at the present day it is employed by natives in trade, and is worked in Futa Jallon at Bure, and in various parts of the Niger bend.

Climate, Hydrography and Productions.—In West Africa, as indeed in the greater part of that continent, climate is the most important element of differentiation between regions. Between the Sahara and the Gulf of Guinea it determines all the zones of transition from the arid desert to the great equatorial forest. The northern border of Senegambia and the Sudan, although visited by regular summer rains, has a very dry character; it borders immediately on the desert region from which there is an important trade in typical products of arid countries—gums (*Acacia verek*), ostrich feathers and salt. Further towards the south the rainy season is longer, and the number of rainy days increases from 35 per annum on the Senegal to 84 on the Casamance and 137 on the Rio Nunez in French Guinea. The duration of the storms increases also from a few hours to several days. The arid northern desert, dotted with acacias and other thorny plants, and raising horses and camels, gives place to the open woods of the Sudan with clumps of baobabs and *karité*, cultivated fields yielding harvests of rice, maize, millet, hemp, cotton and sesame, and herds of cattle and flocks of sheep on the plateaux of Futa Jallon and Mossi. Finally, south of 8° or 9° N., stretching for a breadth of from 100 to 200 miles to the Guinea Coast, comes the belt of tropical forest, where the principal commercial products are all derived from trees, especially from the oil-palm (*Elæis Guineensis*), various woods, india-rubber, kola-nuts, mahogany, &c. The temperature of the forest region of the Ivory Coast and Dahome, shows the typical equatorial uniformity, averaging from 75° to 80° F.; and the year is divided into two dry and two wet seasons.

The hydrography corresponds to these divisions. The Senegal, 1,000 miles in length, and the Niger, with a length of 2,500 miles, draw the supply of their upper courses in a large number of tributaries from the southern Sudan; but when they reach the latitude of 15° N. both begin to shrink in

the desert area where no affluents reach them. The Niger, however, re-enters the equatorial zone and again receives notable tributaries after its great sweep to the north. Unfortunately neither of these great rivers is so valuable a means of transport as could be desired. The rapids of Kayes on the Senegal, and those of Bammako, Ansongo, and Bussa (where Mungo Park met his death) on the Niger, putting a stop to through navigation.

Peoples.—The ethnology of French West Africa is a confusion which has not yet been satisfactorily disentangled. On the Senegal the Moors (Braknas, Trarzas, Duaish) of mixed Hamitic and Negro blood are nomads devoted to stock-raising and to the trade in gums and salt. They live on the right or Saharan bank of the river, and also in the Sahel between the upper Senegal and the middle Niger. Towards Timbuktu and the northernmost part of the great bend of the Niger the French have to deal with the Tuareg Berbers (Kel es Suk, Kel Antassar, Iregenat) and with the Arabs, both peoples living amongst laborious populations of Negroes (Sonrhai) whom they have enslaved. In the Sudan properly so called and in the western colonies the dominant race is the Peulh or Fula, a pastoral people of coppery complexion and of slender figure, whose origin is obscure; and the Toucouleurs, an enterprising warlike and very fanatical race of mixed Fula and Negro blood. All the peoples named above are Mohammedans, Islam being the sole, or at least the dominant, religion of the desert, the banks of the Niger below Segu and of Futa Jallon. The other peoples are of Negro race and practice fetishism; the chief are the Mandes or Mandingos (Sarrakole, Malinke, Bambara), who are an agricultural and warlike people; the Wolofs and Serere on the Senegal coast; and the Susu, Agni, and Ewe on the Guinea coast. The people inhabiting the bend of the Niger are extremely complicated in their affinities; it is sufficient to mention the Diula, most of whom are small traders. Finally the marshes of Guinea and the equatorial forest shelter the remnants of many conquered tribes approaching extinction, people who have become degraded and lead a purely savage life, being often cannibals.

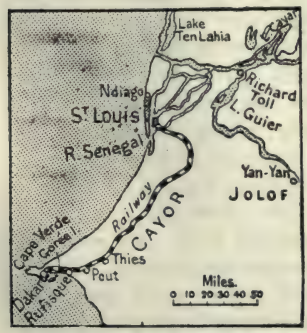

FIG. 455.—*The St. Louis-Dakar Railway.*

The Colony of Senegal.—As the oldest colony, that of Senegal presents the most regular development. It is a flat country as far as Bakel, 400 miles up the navigable river. The climate, although tropical with summer rains, is subject to the influences of the desert, and this influence is also to be seen in the often bare and burnt soil, the thorny vegetation, the use of the camel, and the mingling of the Moors with the Fula and Toucouleur elements of the population. All the ports of the colony, *Gorée, Rufisque,* and especially

Dakar, on a magnificent bay, lie to the south of Cape Verde and are united to the capital, *St. Louis*, at the mouths of the Senegal, by a railway of 140 miles, with its terminus at Dakar (Fig. 455). St. Louis is one of the finest towns of West Africa, and also one of the oldest. The trade of Senegal deals principally with ground-nuts cultivated in the colony, and gums coming from the desert.

French Guinea.—The old colony of the Southern Rivers (*Rivières du Sud*) now called French Guinea (*La Guinée française*) includes (with the exception of the three rivers of Portuguese Guinea) the basins of the numerous coast streams which flow from Futa Jallon to the Atlantic between the British colonies of the Gambia and Sierra Leone. Since 1897 Futa Jallon and its capital, *Timbo*, have been occupied by the French. The low unhealthy Guinea coast peopled by the remains of beaten races, Manjaks, Nalus, Bagas and Jolas, who are being driven towards the west by the stronger Fulas and Mandingos, seems to be one of the most promising parts of West Africa. It supplies a great abundance of india-rubber and ground-nuts, and seems capable of also yielding coffee, cacao, and kola-nuts. The port of *Konakry* has in recent years acquired real importance, and is attracting the trade of Futa Jallon. French Guinea has also a special importance with regard to communication with the Niger, and a road has been constructed behind the territory of Sierra Leone, to bring the upper Niger at Faranna into relation with the port of Konakry. The construction of a railway between these points has also been begun.

The Ivory Coast and Dahome.—Both the Ivory Coast (*La Côte d'Ivoire*) and Dahome form parts of the French establishments of the Gulf of Guinea, although they are separated on the coast by the British Gold Coast Colony and the German Togoland. The coast is bordered by sand-bars shutting in marshy lagoons and overgrown by mangroves and dense bush. The constant surf along the shore renders landing very difficult, the rollers on the shallow margin of the sea acquiring tremendous force. A wharf has been constructed at Kotonu in Dahome to overcome these dangers as far as possible. The special importance of the Ivory Coast lies in its large rivers, the Sassandra on the west, the Bandana in the centre, and the Komoe to the east. The efforts of explorers have eventually resulted in establishing communication between the upper parts of these rivers and the Bani-Bagoe, a tributary of the upper Niger ; but unfortunately all these rivers are broken by rapids not far from the coast. The Ivory Coast produces a certain amount of gold at Baule and Attie, timber, especially mahogany, palm-oil and palm kernels. The old warlike and bloodthirsty kingdom of Dahome has now been pacified, and its trade consists mainly of the export of palm-oil and kernels, while its imports are those of the whole Guinea Coast—cloth, spirits and firearms. The principal stations on the Ivory Coast are *Bingerville (Ajame)*, *Grand Bassam*, *Assinie* and *Grand*, *Lahu*, each on a sand-bar separating a great lagoon from the sea, while those of Dahome are *Kotonu*, *Agoe*, *Great* and *Little Popo* and *Whyda*.

The Senegambia-Niger Territories.—These territories, formerly the French Sudan, are the part of French West Africa which has awakened the liveliest hopes and called forth the greatest efforts in France. To afford it an outlet to the sea a railway was commenced in 1880 from Kayes on the Senegal, which for a long time had its terminus at Bafulabe, further up the same river, but has now almost reached Bammako on the upper Niger. With the same object the projects of a trans-Saharan railway from Algeria, and of a trans-Nigerian railway from Konakry have been seriously brought forward. These are only projects, but their magnitude demonstrates the remarkable isolation of the Sudan, shut in by the plateaux of Futa Jallon on the west, the equatorial forests of the Guinea Coast on the south, and the Sahara on the north, and measures the importance of opening up communications with that promising country. It explains also the enormous value of the navigable Niger, the upper and middle courses of which, as far as Ilo, have been confirmed to France by the Franco-British Convention of 1898. The hope of being able to extend French territory on the right bank of the Niger below the rapids and so secure direct communication with the sea has had to be abandoned; but the convention concedes the principle of making the Niger an international waterway by creating two French enclaves in the Niger territory below Bussa to serve as river ports for commercial purposes. The convention also officially makes the French colonies of the coast continuous with the French Sudan. It now remains to open up and utilise this vast region, which as yet is merely held in military occupation by small garrisons scattered over the country in many places, including Siguiri, Segu, Bandiagara, and Timbuktu in the upper Niger country, Wagadugu and Nikki in the Niger bend, and Zinder between the Niger and Lake Chad. The native population of the region has been decimated by long-continued wars.

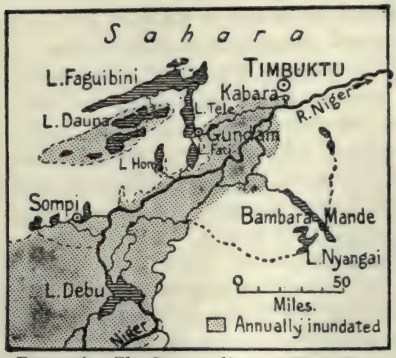

FIG. 456.—*The Surroundings of Timbuktu.*

French Congo.—The foundation of French Congo dates back to the French settlements on the Gabun in 1843, while its immense territorial development is due to the patient explorations and enlightened administration of Savorgnan de Brazza since 1875. Its area is about three times that of France, and although its boundaries are not yet all defined, it includes the basins of the Gabun, Ogowe (a river 500 miles in length), and the Niari-Quillu, and stretches along the right bank of the Congo from Stanley Pool to the Ubangi. Since 1890 the explorations of Crampel, Mizon, Maistre, Clozel, Gentil and Marchand, have extended French Congo northwards beyond the Sanga River to Lake Chad, including the basin of the Shari,

and eastwards to the Nile watershed. The convention of 1898 gave France the right to the eastern shore of Lake Chad. The right bank of the Ubangi, the course of the M'bomu and of its tributaries are dotted with French posts—Bangui, Bangaso, Zemio, Rafai and others. The great difficulty is that of communications through the forests of the Crystal Mountains from *Loango*, the chief seaport on the coast, to *Brazzaville*, the capital of the colony, situated on Stanley Pool. A railway has been projected, but not commenced. The people, mere remnants of conquered tribes, the Pongos, Balumbos, Ashangos, or primitive dwarf races like the Akoas, are but poor material for successful colonising; they are besides oppressed by the Fans or Pahoins, a robber tribe. Thus the colony yields little save natural products, india-rubber, ivory and wood, and a little palm-oil; its trade as yet is only one-quarter of that of the Congo Free State. The primeval forests of the Ogowe are the home of the gorilla, the largest anthropoid ape.

STATISTICS.

(Estimates only.)

	Area sq. miles.	Population.	Trade in dollars. Imports.	Exports.
Senegal and dependencies	96,000	200,000	6,000,000	2,000,000
French Guinea	42,000	?	750,000	1,150,000
Ivory Coast	106,000 [1]	1,250,000	750,000	700,000
Dahome	143,000 [1]	?	2,000,000	1,850,000
French Sudan, French Congo, &c. ..	1,000,000 ?	?	2,000,000	110,000
Total of French West Africa ..	1,387,000 ?	?	11,500,000	5,810,000

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F. Dubois. "Tombouctou." Paris, 1896, and translation, "Timbuctoo the Mysterious." London, 1896.
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— Toutée. "Dahomé, Niger, Touareg." Paris, 1897.
P. L. Monteil. "De Saint-Louis à Tripoli par le lac Tchad." Paris, 1895.

III.—LIBERIA

By Edward Heawood, M.A.

Extent and Surface.—The Negro Republic of Liberia occupies about 300 miles of the Guinea coast immediately to the west of Cape Palmas, the point at which the rounding off of the western limb of Africa begins. Sierra Leone lies to the west, while the north and east are surrounded by French West Africa. Liberia is entirely confined to the basins of the coast streams (the chief of which is the St. Paul), nowhere extending quite 150 miles into the interior. The coast is, as a rule, high, the series of lagoons so characteristic of the more eastern coasts of Guinea being here but slightly developed, owing possibly to the greater exposure to the Atlantic gales.

[1] To 9° N.

Behind a narrow strip of mangrove and pandanus swamps traversed by the lower courses of the streams, the country rises in one or more steps which are marked by the occurrence of rapids in the rivers. The greater part of the surface appears to be covered by forest, for as the interior frontier is still undefined, it is uncertain whether the republic includes any large area of the open plateaux of the Mandingo country.

History and Government.—Liberia had its origin in a settlement of freed slaves—named Monrovia, in honour of the United States president—formed by the American Colonisation Society in 1821. The territory was gradually extended by the incorporation of successive strips of coast, and in 1847 the settlers were placed under a republican constitution. Treaties with native chiefs brought large interior districts under the nominal protectorate of the republic, but in 1894 the territory was curtailed by the agreement with France which fixed the eastern frontier at the Cavalli river. The Manna river is the boundary on the side of Sierra Leone. The official language is English. The well-known Krumen are the most important tribe. No white man can by law become a citizen. The products are those of the forests and of plantations, including Liberian coffee, palm-oil and kernels, and sugar. Besides *Monrovia*, the capital, the chief port is *Great Bassa*.

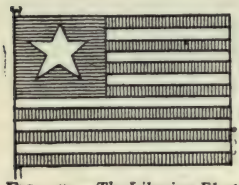

FIG. 457.—*The Liberian Flag.*

STATISTICS (*estimates*).

Area of Liberia (in square miles)	14,000
Population of Liberia	1,000,000
" Monrovia	3,500

STANDARD BOOK.

Sir H. H. Johnston. "Liberia." 2 vols. London, 1906.

IV.—BRITISH WEST AFRICAN COAST COLONIES

By Sir Harry H. Johnston, G.C.M.G., K.C.B.,
At one time Consul for the Niger Coast Protectorate and the Cameroons.

Historical.—The British West African colonies include the Gambia, Sierra Leone, the Gold Coast, Nigeria, the last-named being formed in 1899 to include Lagos, the Niger Coast Protectorate, and the territory formerly administered by the Royal Niger Company. The Gambia was an English settlement in the days of Queen Elizabeth, and the Gold Coast settlements date back to Charles II., in which reign also the British hold on the Gambia was strengthened. Sierra Leone was founded towards the close of the eighteenth century out of purely philanthropic reasons for the repatriation of African slaves. Lagos was taken in 1860 in order to stop the slave trade. The Niger Coast Protectorate was acquired between

1884 and 1888 for the purpose of protecting British markets from absorption by Germany and France. About 1883 all these West African colonies were on the point of being connected almost without break of continuity along the coast, but the British Government shrank from the responsibility of supporting the zealous local officials, consular and colonial. The gaps thus left open were promptly filled by France and Germany, and therefore the British West African colonies at the present day are scattered and of relatively small extent.

THE GAMBIA

Position and Surface.—The colony of the Gambia (and in estimating the area of these colonies the foolish and fine distinction between colony proper and protectorate or sphere of influence is ignored) consists of a narrow strip along the banks of the river Gambia from its mouth to the cessation of navigability at a point about 220 miles from the sea. Much of the land is low-lying and swampy, though above McCarthy Island the country along the banks becomes a little more hilly. The river Gambia is one of the few really satisfactory African rivers as regards navigability; there is never less than twenty-six feet of water on the bar at extreme low tide. Why it is not more highly rated as one of the few good harbours of the west coast of Africa the writer is at a loss to understand.

Climate, People and Resources.—This colony possesses a fairly healthy climate for West Africa; it is far less insalubrious than any other British West African possession. Lying much further north than the other colonies it has an appreciable winter, and from November till March the climate is actually good. The rainfall is not more than 44 inches per annum, and is restricted mainly to the summer months. The resources of the country are entirely agricultural, and the principal product is the ground-nut (*Arachis*). Other articles of export are hides, bees-wax, palm kernels, india-rubber and rice. The flora and fauna belong more to the Ethiopian sub-region than to the West African; there are no anthropoid apes, but most of the big African mammals, such as the giraffe and the larger antelopes, are present.

The natives chiefly belong to three different stocks, the Wolof, Felup and Mandenga (or Mandingo). There are also a few Fulas in the north. The Wolof are the handsomest of all negro races, very black, but with almost European features. The Mandenga and Felup are of light brown complexion, with hair which tends to be long and wavy rather than closely curled. They are evidently negroid rather than negro, and in a greater degree than the Wolof exhibit Hamitic affinities. The Felup, on the other hand, belongs to a marked and ugly negro type. The languages which they speak seem to offer a far-off resemblance in structure to the Bantu languages of central and southern Africa. The Felup are chiefly pagans; but most of the other negro and negroid peoples of the Gambia are Mohammedans.

Besides agriculture, cotton is grown, woven and dyed by the natives, and these manufactures are often exported to other parts of West Africa. "Gambia cloths" enjoy great local renown.

The system of intercommunication is almost entirely by water. A Government steamer runs weekly to and from the capital, Bathurst, at the mouth of the river, to McCarthy Island, about 150 miles inland. *Bathurst* is the one town of any importance. The trade of the Gambia has diminished of late years, and less than half is with the British Empire.

SIERRA LEONE

Boundaries, Surface and Climate.—Sierra Leone is bounded on the north and west by French West Africa, and on the east and south-east by Liberia. The northern half of the territory is moderately mountainous, the hills even extending to the coast at the Sierra Leone peninsula. The southern part is low and swampy, especially in the Sherbro district. The climate of all Sierra Leone is unhealthy, but the coast decidedly so; yet some improvement is discernible, and there is less loss of life amongst Europeans at Freetown than in former days, when it was called "the white man's grave." The all-year-round temperature is high, averaging 83° F.; and the rainfall heavy, said to reach the extraordinary average of 138 inches at Freetown, but diminishing considerably in the interior, where it probably does not exceed 50 or 60 inches per annum. The country is traversed by a good many rivers, the more important of which are the Great and Little Scarcies, the Rokel, and the Bamopamo or Sherbro river, many parts of which are unexplored. The Rokel is navigable for 40 miles from the sea, and the Sherbro river for about twenty miles. Other means of communication are simply the narrow African paths and human porterage, though there is a good deal of canoe navigation on the lagoons and creeks which break up the indefinite coast line in the south. Horses are in use amongst the natives of the far interior, but will not thrive on the coast. The highest mountain is Mt. Daro, 4,396 feet in height. On the northern versant of the range from which these mountains rise the Niger takes its source.

Flora, Fauna and People.—The flora and fauna of the coast belt of Sierra Leone are typically West African. The chimpanzee is still found in the Sherbro district, the only part of West Africa where anthropoid apes are known west of the Cameroons. The vegetation along the coast is extremely luxuriant; in the mountains of the interior, however, where the rainfall is less, the land is much barer and forest only exists in patches.

The native population is entirely negro or negroid, belonging to the Mandenga and Timne stocks. The Mandenga form the bulk of the races in the north-eastern part of the colony, but have pushed their way to the coast in various places through the more truly negro peoples, with whom

they are now to a great extent mixed. The Timne, Bulom, and other allied peoples are absolute negroes, belonging to a stock which forms the main coast population between the river Gambia and the borders of Liberia. They speak languages which in structure, though not in vocabulary, offer a striking resemblance to the Bantu family. At Freetown and one or two other points on the coast there are large settlements of Krumen, a race probably indigenous to Liberia. The coast peoples are pagan or nominally Christian, and those of the interior are Mohammedans, many of them using Arabic characters for writing.

Government and Trade.—Patches of territory along the coast are directly administered by the Colonial Government. The interior still remains under the rule of native chiefs supervised by travelling commissioners. There are few or no manufactures, and agriculture is much neglected. Trade chiefly takes place in the wild products of the country, such as palm-oil, kola-nuts, india-rubber, copal, oil-seeds and ginger. Hides are exported, and also cattle to a slight extent. A small trade is done in tropical fruits such as pineapples, which are exported to Great Britain. The only town of any importance is *Freetown*, the capital at the mouth of the Rokel river, with the best harbour in all West Africa.

FIG. 458.—*The Badge of Sierra Leone.*

THE GOLD COAST

Surface and Climate.—The British possessions on the Gold Coast are bounded on the west and north by French territory, and on the east by the German colony of Togoland. The country is generally low-lying, with the exception of a range of hills stretching north-west from the lower Volta into Ashanti. It is doubtful whether the land anywhere reaches a height exceeding 2,000 feet. The principal river is the Volta, navigable by small boats not more than 60 miles from its mouth, and rising very far in the interior, right up in the bend of the Niger, in two long streams, the Black and the White Volta. The river Ankobra is navigable for about 50 miles. The Pra was long remarkable as the boundary between Ashanti and the rest of the Gold Coast in its upper waters. The rainfall varies extraordinarily ; in the western districts near the coast probably exceeding 100 inches per annum ; in Ashanti and other interior districts ranging from 50 to 70 inches. The eastern part of the colony is much dryer, though its low-lying and swampy nature makes it equally unhealthy. Round about Accra there is a remarkable dry patch in which the annual rainfall scarcely reaches 18 inches. The climate everywhere seems to be terribly unhealthy for Europeans ; the two chief maladies are black-water fever and dysentery. The mean temperature for the year is 85°.

Flora and Fauna.—The fauna and flora are those of the typical West African region. As far as is known there are no anthropoid apes.

The antelopes are chiefly represented by the genus *Cephalophus*, a low and primitive type of antelope. A guinea fowl (*Agelastes*), also of low type, exists, and there is a great abundance of monkeys and baboons, including the Diana and Colobus (the latter furnishing the monkey skins of commerce), and the great Mandrill baboon. The flora of the Gold Coast is very little known, and would probably yield surprising results if investigated.

People and Government.—The natives are a fairly homogeneous type of West African, except in the north, where there has been some slight intermixture with a higher negroid race. The stock to which the inhabitants belong is related linguistically (except in the extreme west) to the races of the Lower Niger, and, in an extremely distant way, to the Bantu group. In the west the people have more affinity to the Kru tribes of Liberia.

The coast belt, and now Ashanti also, are directly administered by the Imperial Government. Elsewhere in the interior the people are governed by their native chiefs under the supervision of travelling commissioners. The Gold Coast Colony is the best governed and most prosperous of British West African possessions; and though it is disastrous in the loss of life it entails to Europeans, it is of great importance to British commerce.

Trade and Towns.—There are almost no manufactures, nor is agriculture much developed; nevertheless trade in the wild products of the country is considerable. The chief articles of export are: india-rubber, palm-oil, gold, kola-nuts, monkey skins, ivory and timber. In the eastern part of the Gold Coast poultry of all kinds thrive remarkably, and are exported as provisions for ships, mainly at Kwita. The rivers of the western part of the colony roll down from the mountains the gold dust which for centuries has given this country the name of the Gold Coast. Gold mining might be carried on to a more considerable extent were it not for the climate. The most important town is the capital, *Accra*, and other trading towns are *Cape Coast*, *Elmina*, *Kwita*, and *Axim*. Native towns where there are no European settlers vary so much from year to year in extent or existence that they are hardly worth enumerating; but the capital of Ashanti, *Kumasi*, will probably remain the administrative centre of that district. *Salaga*, an important native city of an entirely Mohammedan character, came definitely under British influence in 1899, when the mountainous country to the north of the Volta, formerly a neutral zone, was divided between the Gold Coast and German Togo.

Means of communication are very bad. The rivers are mostly unnavigable, or only navigable by means of native canoes. The vegetation is extremely luxuriant, and even the native paths are frequently blocked. In the dry and open country of the far interior horses are in use, and in the eastern districts they can be kept in good health and condition near the coast.

LAGOS AND THE NIGER COAST PROTECTORATE

Position, Boundaries and Surface.—Lagos and the Niger Coast Protectorate may be appropriately considered together, for they are naturally conterminous and geographically similar, and though separate for some purposes, they form part of Nigeria as one administration. They are bounded on the west by the French possessions of Dahome and Porto Novo, on the north by the part of Nigeria formerly the Royal Niger Company's territory, and on the east by the German colony of Kamerun. Lagos lies entirely to the west of the course of the main branch of the Niger, while the Niger Coast Protectorate occupies most of the rest of the delta.

Much of this land on the Niger delta is, of course, flat and swampy;

FIG. 459.—*The Niger Delta. Creeks not accurately surveyed are dotted.*

but high land is not very far away from the coast regions. There are hills rising to over 1,000 feet—even, it is said, in places to 3,000 feet—in the protected States at the back of the limits of the actual colony of Lagos. There are mountains of perhaps 6,000 feet at the extreme east of the Niger Coast Protectorate, within the loop of the Cross River, which, under the name of the Rumbi Range, are connected with the great volcanic peak of Kamerun just outside British territory. To the north of the Cross River the land is undulating, and probably rises into hills before the territories of the Royal Niger Company are reached. A great deal of the land of the Niger delta, though only a few feet above the level of the sea, is free from marsh, and has even an exceedingly pleasant aspect, as in the well-cultivated Ibo country. The river system is mainly composed of the Niger river and its well-nigh innumerable offshoots or their

independent tributaries, and of the Cross River which, except near its estuary, is quite separate from the Niger system. From the borders of the Kamerun district to the east of Dahome—almost to the Gold Coast on the west—there is a system of intercommunicating lagoons and creeks all along the coast-line. If certain narrow creeks were annually cleared of vegetation, it would be possible to pass in a native canoe from the German Kamerun to the eastern border of the Gold Coast colony without going out to sea (Fig. 459). Over all this territory the network of deltaic branches affords the most remarkable facilities for transport by water. On the other hand, the movements of any land force are seriously impeded, and the native paths through the jungle are little used, except in the Cross River region, a dry and fairly elevated country. Some of the mountainous region on the eastern frontier of the Niger Coast Protectorate appears to be of volcanic origin ; elsewhere the hills are masses of granite and disintegrated granite, forming the hard, red soil which is the formation of the higher land, the remainder of the country being purely alluvial, and formed by the detritus brought down by the Niger.

Climate, Flora and Fauna.—The climate of all this region is excessively unhealthy ; it is perhaps the unhealthiest part of Africa. Yet the natural products are so rich, and trade is so profitable, that there is probably a much larger proportion of Europeans here than in other West African possessions, and life is more comfortable and in some respects more civilised. The mean annual temperature is about 84°, and it is very rarely indeed that the thermometer in the lowlands goes below 75° ; while the rainfall is seldom less than 100 inches annually, and sometimes reaches 130 inches. In the districts along the upper Cross River a far more pleasant climate is attained, with cool nights, and even an appreciable cold season. The rainfall there is not so heavy—possibly not more than 70 or 80 inches per annum. With the hot sun and abundant rainfall the forests are beautiful to a degree of luxuriance scarcely equalled elsewhere in Africa, except possibly in parts of the Gabun. The banks of the rivers within reach of the tidal influence are bordered with gigantic mangroves, which rise in a tropical forest of great density, singularly beautiful in places, and magnificent in its scenic effects. The tree of trees of the Niger delta is the oil-palm. This district produces the best palm-oil in all Africa. The fauna is more disappointing to the eye, though the abundance and variety of the lower forms of life makes up for the comparative scarcity of mammals and birds. The elephant still lingers in the uninhabited parts, even quite near to the coast, and I have more often seen wild elephants in the Niger Coast Protectorate than in any other part of Africa, even on the river Congo. On the other hand, it is doubtful if anthropoid apes are found anywhere in the lower Niger. A remarkable lemur (the Potto) is

FIG. 460.—*The Badge of Lagos.*

peculiar to this district. The most prominent birds are the grey parrot and the large blue plantain eater (*Schizoris*).

People.—The inhabitants belong to several distinct stocks. They are all absolute negroes, yet on the upper Cross River, people with finely-cut features may be met with from time to time, and here, as among the Efik people of Old Calabar, the skin is yellow-brown rather than black. Some of the tribes in the almost unexplored parts of the Niger delta are singularly savage-looking—black-skinned and low-browed, seeming to represent some stranded stratum of very old type. Cannibalism is extraordinarily prevalent except where European influence has long prevailed. The people of the upper Cross River fatten slaves for months before killing them. A rough classification distinguishes: (1) The Yoruba-Jekri stock, which would also include the Jebus and other peoples round Lagos; (2) The Bini stock, or the people of Benin and Sobo; (3) The Ijos, or the people of the central Niger delta near the coast (Bonny and Brass), who, like the Bini, appear to have been the earliest settlers in the delta; (4) The Kwos of the district between Opobo and Old Calabar; (5) The Ibo of the districts between the Lower Niger and the Cross River; (6) The Efik people of Old Calabar; (7) The tribes of the upper Cross River; (8) The Akwa, between the Cross River and the Kamerun watershed (the last five groups speak what may almost be called semi-Bantu languages); and (9) the few tribes speaking Bantu languages on the extreme south-eastern border of the Niger Coast Protectorate. This district appears to have been very populous in times past, so much so that the struggle for existence created a gigantic traffic in slaves, which attracted Europeans, and even produced a certain amount of half-indigenous civilisation. The kingdom of Benin was a State of some antiquity which had apparently acquired some knowledge of art and industry from the Niger districts, which in their turn had been partially civilised by Mohammedan influence. The civilisation of Yoruba is entirely Mohammedan, and almost all the people of that country belong to that religion; which also exists at Lagos, but elsewhere in the Niger delta is quite unknown. The Yoruba people are ordinarily amply clothed, and this style of Mohammedan clothing has also extended in some degree to the town of Lagos; but where untouched by Islam the people are extraordinarily nude, even when to some extent civilised by contact with Europeans. In the eastern part of the protectorate women go entirely nude before they are married, and do not wear any appreciable clothing afterwards. Men were formerly so careless on this score that chiefs of considerable wealth, even able to read and write English, have had to be rebuked by the writer for appearing at his consular court without a particle of clothing except a peaked cap. Where Mohammedanism does not prevail the religion is a form of Fetishism. Human sacrifices are the order of the day, and the religion is probably more bloody and cruel than anywhere else in savage Africa.

Trade.—The total value of the annual trade of Lagos and the Niger

Coast Protectorate is probably about twice as great as that of the other British colonies on the coast taken together. The principal exports are palm-oil and palm-kernels, rubber, kola-nuts, copal, gum, shea-butter, a little coffee and a little ivory. With the exception of leather work, and the weaving and dyeing of cotton garments in Yoruba and Lagos colony, there are practically no native manufactures in the country. The people of Old Calabar, however, have a pretty taste for carving ivory and decorating brass plates, and these articles are sometimes exported as curiosities.

Administration and Towns.—As regards political divisions: the Government of Lagos in 1898 included the colony proper, which is a small strip of coast between Porto Novo and Benin, a number of small adjacent kingdoms, treated as protected States, and a sphere of influence which included the large countries of Abeokuta and Yoruba. Lagos is a crown colony under a governor, assisted by an executive legislative council. Southern Nigeria is under the charge of a High Commissioner, whose seat of government is at *Asaba*. Other important towns are *Idda*, near the boundary of Northern Nigeria, and *Akassa* at the Nun mouth of the Niger.

FIG. 461.—*The Protectorate Badge.*

The principal towns of the Niger delta are *Lagos*, *Brass*, in the eastern division of the Niger Coast Protectorate, *Bonny*, *Opobo*, *Old Calabar*. There are also the following trading stations where Europeans reside:—*Badagry*, *Leki*, *Akorodu*, *New Benin*, *Forcados*, *Kwo-ibo*, and *New Calabar* (no connection with Old Calabar). In addition, towns of importance, either for historical association or for trade, are *Epe*, *Abeokuta*, *Ibadan*, *Odeondo*, *Benin*, *Bende*, *Oguta*, and *Aron*. The population of these towns varies from 100,000 to 5,000 according to local circumstances, such as the goodness or badness of their rulers, the state of trade, or the influence of Europeans. None of them, except perhaps Abeokuta and Benin, are of any permanence in the way of buildings. A railway has been constructed from Lagos to Abeokuta, a distance of 50 miles.

STATISTICS.

(*Estimates for the most part.*)

	Area (square miles).	Population.	Europeans.	Exports.	Imports.
The Gambia	2,700	150,000	50	$750,000	$600,000
Sierra Leone	30,000	3,500,000	250	$2,250,000	$2,250,000
Gold Coast	53,000	2,000,000	800	$4,250,000	$4,250,000
Lagos and Niger Coast Protectorate	80,000 (?)	6,000,000	1,000	$8,000,000	$8,000,000

POPULATION OF TOWNS (*estimated*).

In the Gambia:—Bathurst, 6,000.
In Sierra Leone:—Freetown, 30,000.
In Gold Coast:—Accra, 16,000; Cape Coast, 11,600; Elmina, 10,500.
In Lagos and the Niger Coast Protectorate:—Lagos, 30,000; Old Calabar, 15,000; Brass, 10,000; Opobo, 10,000; Bonny, 6,000.

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V.—NORTHERN NIGERIA

By Lieut.-Colonel A. F. Mockler-Ferryman

Position and Extent.—That portion of the south-western Sudan in the Niger basin which was developed by the Royal Niger Company had a coast-line extending from the Forcados River on the west, to the Nun mouth of the Niger on the east, a distance of 100 miles, being wedged in between the various districts of the Niger Coast Protectorate. Inland the boundaries were less clearly defined, though its limits northwards have been fixed by the Anglo-French Agreement of 1898 as a line drawn from a point ten miles above Ilo on the Middle Niger to the point of intersection of the 14th parallel of north latitude with the meridian passing 35′ east of the centre of the town of Kuka, on Lake Chad, such line being so traced as to include within the Niger Company's territories the whole of the Empire of Sokoto. On the west, the area was bounded by the colony of Lagos, and by the hinterland of French Dahome, while its north-eastern boundary to the south of Lake Chad runs with the western boundary of the German Kamerun colony as determined by the Anglo-German Agreements of 1885 and 1893. The tract of territory described thus roughly—for the actual boundaries have not so far been surveyed—includes an area of some 500,000 square miles, with a population approximately estimated at thirty millions, within which there naturally exists a great variety of country and of inhabitants. Practically there were two well-marked zones, separated by the parallel of 7° N., the southern part being now united with the Coast Protectorate under the name of Southern Nigeria; it is low-lying, swampy and unhealthy, with pagan inhabitants. The northern part, now Northern Nigeria, is an undulating, dry and healthy region, peopled principally by Mohammedans.

The River Niger.—The river system of this part of West Africa is simple, for, if we except the portion of Hausaland and Bornu which lies on the edge of the basin of Lake Chad, the whole of Nigeria is drained by the river Niger and its numerous tributaries. After flowing past Timbuktu, the Niger enters the territory to which it has given its name at its junction with the Dallul Mauri, about 11° 45′ N., from which point, until it eventually empties itself into the Atlantic, it receives many minor rivers and streams, none of which, however, add much to its volume except during the rains. The fall of the river from its source to its mouths averages barely a foot per mile, and in the dry months, even its largest tributary, the

Benue, is unnavigable by vessels drawing more than two feet of water. The principal tributaries of the great river in its course from Ilo downward, are, on the left, the Mayo-Kebbi, or Sokoto River, from Sokoto and its neighbourhood, and the Kaduna through Nupe ; while on the right the small rivers that drain the countries of Borgu and Ilorin flow in, the watersheds in each case lying outside the limits of Nigeria. At Lokoja, in 8° N., the Benue river joins the Niger, which in the very wet season it rivals in size. Taking its rise in the Bubanjidda mountains, this magnificent waterway flows west and south-west, receiving throughout its course of some 700 miles such lesser rivers as the Faro, Tarabba, Donga and Katsena from the south, and the Kedara and innumerable small streams from the north. From the Niger-Benue confluence to the sea is a distance of about 300 miles. The Niger descends in one large stream until it reaches the town of Abo in 5¼° N., at which point the delta commences, and the river splits into innumerable interlacing channels, the more important mouths being those of Forcados (Warri), Nun (the principal), Brass, New Calabar and Bonny (Fig. 459). The large Lake Chad, to which the north-east angle of Nigeria reaches, receives only one river of any size flowing from the territory, this is the Yobe or Yeou, which rises some 450 miles west of the lake.

Surface and Productions.—The land is everywhere fertile, and produces vast crops with the minimum of cultivation, while many articles of commercial value are found among the natural products. Of these, palm-oil, rubber, shea-butter, kola-nuts, various fibres, oil seeds and spices may be mentioned. Valuable timber trees grow in the southern forests, iron in abundance is forthcoming in many parts, tin and galena have been found in the Benue districts, and ivory is still offered for sale in considerable quantities. Of the fauna it is sufficient to say that the hippopotamus is met with in all the large rivers ; that herds of elephants roam the forests, most abundantly in the neighbourhood of Lake Chad, and in the country to the south of the Benue ; that various species of antelope are found everywhere ; while lions, wolves, hyænas, civet cats, and many varieties of monkeys abound in Upper Nigeria.

People.—The inhabitants may be classified as members of two main families, Negroes who are still pagans and Fulas who are Mohammedans, with a cross between the two known as Negroids, and also of Mohammedan faith. The aborigines were probably pure negroes, and the Fula element is an introduction of recent times, while the negroids are the result of Mohammedan conquest and subsequent intermarriage. The Idzo, Ibo, and Igara on the Lower Niger, the Borgu on the Middle Niger, and the Igbiri, Mitshi, and Juko on the Benue are amongst the most important of the many tribes of pagan negroes, either wholly independent or only partly under the influence of the Mohammedan Fulas. The languages spoken by these tribes are all different and absolutely distinct, though merging into one another on the borders. The

remainder of Nigeria, and certainly the most valuable part, is inhabited by the Yorubas, Fulas, Hausas, and Bornus, with languages of their own and, two centuries ago, forming separate nations.

Occupations and Trade.—The pagans are for the most part agriculturists, though cultivating only to an extent sufficient to supply their own wants; fishing and hippopotamus-hunting are indulged in by the tribes dwelling on the river banks, and elephant-hunting by those inhabiting the more inland parts. The collection and manufacture of palm-oil and rubber occupy the attention of the bulk of the coast population; north of the limits of the oil-palm, the European traders encourage the collection of various gums, fibres, oil seeds and spices. The Nupes and northern Yorubas, though mainly occupying themselves with husbandry, are far-famed among Sudan tribes as blacksmiths, workers in brass, leather and glass, as weavers, and as canoe-builders; while the great Hausa nation furnishes the merchant and industrial classes of the western and central Sudan. Hausa merchants convey their wares to all parts of central Africa, to the Mediterranean, to the Atlantic, and even into the countries bordering on the Upper Nile, the chief articles of commerce being cotton-cloth and tobes woven at Kano (the Hausa capital), leather-work, embroideries, and kola-nuts. The Fulas are warriors and slave-raiders, but their original occupation of peaceful herdsmen is still followed by a proportion of the people, who wander throughout the country with their herds and flocks. The numerous waterways afford excellent communications in the delta, while Northern Nigeria is intersected by regular caravan routes, which are, however, merely narrow tracks trodden down by the native carriers and beasts of burden. The trading steamers of the Royal Niger Company ply on the main Niger and Benue for a distance of several hundred miles from the sea, and good roads have been made in the immediate vicinity of the trading stations.

Native Kingdoms.—The various native kingdoms are governed by their own rulers, who in all cases, in return for an annual subsidy, acknowledge British suzerainty. In the Niger delta the semi-independent chiefs are innumerable, but Northern Nigeria consists, besides the minor kingdom of Borgu and such few pagan tribes as have not as yet been conquered by the Fulas, of the two great empires of Sokoto and Bornu (capital Kuka, population 50,000). The **Sokoto** or **Fula Empire,** which comprises the old Hausa States and the once-independent kingdom of Gando, contains seventeen provinces, including Adamawa, Kano, Nupe, Yoruba (Ilorin), and Lafia—the last three owing allegiance to Gando as well as to Sokoto. Each of these provinces is governed by an emir, who is virtually the sovereign of a small kingdom, though liable to be deposed at the will of the Sultan of Sokoto. The system of government and inspection is thoroughly organised, with a complete scheme of taxation for each province, the inspecting officer being responsible that the emirs pay their annual tribute, which usually consists of slaves.

Government and Towns of Nigeria.—The government of Northern Nigeria passed from the hands of the Royal Niger Company into those of a High Commissioner acting directly for the British Government in 1900. The seat of administration is *Zungeru*, on the Kaduna. At the confluence of the Niger and Benue is the small native town of *Lokoja*, whose central situation caused it to be selected as the military headquarters of the Royal Niger Company and provisionally of the new Imperial forces. On the middle Niger the only towns worthy of notice are *Egga*, *Rabba*, and *Bussa*, while *Ilorin*, the northern Yoruba capital, lies about seventy miles south of Rabba on the great trade route between Hausaland and Lagos. The Benue towns, with the exception of *Yola*, the capital of Adamawa (population 10,000), are small and unimportant, the principal being *Loko*, the port of Nassarawa, and *Ibi*, which is the Benue headquarters of the Royal Niger Company, with populations considerably under 6,000. The chief towns of the Fula Empire are the capitals of the several provinces, of which may be mentioned *Sokoto* (population 15,000), *Wurno* (5,000), *Gando* (6,000), *Bida* (15,000), *Zaria* (30,000), *Nassarawa* (10,000), *Kano* (70,000), and *Bauchi* or *Yakoba* (100,000), the estimated population in all cases being a mere approximation, and the relative importance of each depending on its situation with regard to the main trade routes of the country. There are no statistics of Nigeria which can be looked on as definite, the organisation of the country having been too recently undertaken to admit of complete surveys or censuses being attempted.

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VI.—GERMAN WEST AFRICA

By Graf von Pfeil.[1]

Togo.—The colony of Togo has not quite 60 miles of coast, which, running almost east and west near the west end of the Bight of Benin, consists of a narrow low strip of yellow sand. Behind this a belt of forest separates the sea coast from the long lagoon which runs parallel to nearly the whole length of it. Some distance further inland there is a lake, which must be considered as belonging to the lagoon system. There is no harbour on the coast and landing is rather difficult through the heavy surf, the "Kalema," which breaks upon the coast all the year round. Togo has a number of rivers; two, which nearly form the eastern and western

[1] Having no personal knowledge of Togo the author has consulted mainly the "Mittheilungen aus den Deutschen Schutzgebieten," and other works cited at the end.

boundaries, the Mono and Volta, are of considerable size, and the latter is navigable in some part of its upper course. Two ranges of mountains traverse Togo from south-west to north-east, and form the hilly southern border of the plateau of the western Sudan. The plateau is an undulating prairie with a slight incline towards the west, and with little vegetation beyond tall grass. Vegetation on the coast is remarkable for the oil-palm, wild coffee, shea-butter tree, rubber plants, baobab and a very good quality of ebony. The climate is not healthy; it possesses the character of the southern hemisphere, the hottest months being December and January, the least warm July and August. There are no people of Bantu race in this colony, whose inhabitants belong exclusively to the Sudanese tribes. On the coast fetishism is prevalent, while in the north Mohammedanism is rapidly gaining ground. The people are agriculturists and good traders; on the plateau they are warlike and constantly at feud with each other. Togo is a German colony, with a governor, a staff of officers, and a police corps of 150 natives, a court of law and a hospital. The governor's residence is *Sebbe*, and there are two government stations in the interior, namely, *Kratji* and *Misahöhe*. *Bismarckburg* is also a trading station.

FIG. 462.—*The Flag of the German Protectorates.*

Kamerun.—Position and Surface.—The German colony of Kamerun (the Cameroons) has only about 190 miles of coast on the Bight of Biafra, which is deeply indented by the outlets of a comparatively large number of rivers (Fig. 466). All these have one peculiarity in common, the lowest part of their course turning in a north-westerly direction. The reason for this is found in the "Kalema," a deep sea swell which breaks with great force upon the coast all the year round. The largest indentation is Kamerun Bay, which is an excellent harbour. The coast forms a strip of very low land, narrow in the south and widening to about 30 miles near the bay. East of this the country rises gradually and forms a range of mountains with meridianal direction, a valley separates them from a second steeper rise, the ascent to the main plateau of the African continent, which here presents the form of undulating grassy plains. The plateau extends to about 8° N., where it abruptly descends to the valley of the Benue river, to which its northern slope gives birth. The Kamerun Peak rises from a volcanic rift which reaches nearly to Lake Chad as indicated by the two mountain ranges, Chebchi and Mandara; its altitude is about 12,480 feet. At the foot of the peak rise two gaseous springs, while further up hardly any water is retained by the porous lava, of which the mountain is composed. The greater part of the Kamerun coast is taken up by mangroves, which fringe some of the estuaries far inland; further south, the Batanga coast is grassland. The mountains are covered with dense forest, in which the oil-palm, rubber plants, kola-nut, ebony and the wild coffee tree occur frequently. The

Kamerun Peak is dotted with the same forest up to 8,300 feet, beyond which vegetation diminishes gradually, and ends with short grass, which covers the summit. The fauna is that which is peculiar to tropical Africa, but is remarkable for its anthropoid apes, the chimpanzee and gorilla. A number of rivers, some of them, for instance the Nyong and Lokunja, navigable for steam launches for a number of miles never exceeding thirty, run into Kamerun Bay. The Lokunja, though the smaller, is navigable for some distance above the rapids, which intersect all the rivers where they break through the range of mountains west of the steep plateau border, whence all the Kamerun rivers descend in high cascades, forming insuperable barriers to navigation. The only river likely to prove navigable, even on the plateau, is the Sannaga, which joined by the Mbam, forms the main water-course of Kamerun. The northern part of the country sends its water west to the Benue or east through the Shari to Lake Chad.

People and Government of Kamerun.—Among the inhabitants two groups may be distinguished, the Bantu and the Sudanese. The former live mainly to the south of 7° N., the latter as a rule north of that parallel in the State of Adamawa. The Bantu are great traders, the Sudanese agriculturists, who imported from the north the horse and horned cattle. There is little industry beyond carving in wood and the smelting of iron. For purposes of administration Kamerun is divided into three districts, with leading officials subordinate to the Governor. There are two courts of law, and a number of colonial troops are garrisoned in various stations throughout the country, of which *Mpini*, *Victoria*, *Buea*, and *Yaunde* deserve special notice. *Rio del Rey*, *Bibundi*, *Little* and *Great Batanga*, and *Kribi* are ports of call. *Kamerun* (now known as *Duala*), the chief harbour, is also the seat of the Landeshauptmann, or Governor; it has a custom house, post, and telegraph. In a good hospital colonial officials and missionaries receive medical and other attention gratuitously.

STATISTICS (*Estimates*).

	Area (square miles).	Population.
Togo	23,160	2,500,000
Kamerun	191,130	3,500,000

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VII.—CONGO FREE STATE

By Sidney Langford Hinde,
Formerly Captain in the Congo Free State Forces.

Position and Boundaries.—The Congo Free State (*L'Etat Indépendent du Congo*), occupies the heart of Central Africa, and is crossed by the equator. The great river, the mouth of which was formerly known as

the Zaire, received its name of Congo from the chief of a small tribe in the neighbourhood of Boma, the Portuguese supposing him to be king of the whole country. The Congo is not so called by the natives in any part of its course, but is known to them by different names according to the district through which it flows. Except for a narrow strip at the mouth of the river, giving access to the Atlantic, the western boundary of the State is the Congo itself, and its great northern tributary, the Ubangi, separating the Free State from French Congo. The river Mbomu is the northern boundary. Eastwards, on the Upper Nile, the State occupies a district on lease from Great Britain; and further south the boundary is the Central African Rift Valley and the eastern shores of Lakes Albert, Albert Edward and Tanganyika, separating the State from British and German East Africa. The southern boundary, towards British Central Africa and Portuguese West Africa, is irregular, not following definite physical features, and in some parts undecided. The range in latitude is from 5° N. to 13° S.; and in longitude from 17° to 30° E.

Physical Features.—The vast country coincides roughly with the basin of the Congo, excluding only the tributaries on the right bank from Manyanga to the mouth of the Ubangi, the northern tributaries of the Ubangi and Mbomu, the eastern tributaries of Luapula, before it enters Lake Mweru, and the head waters and western tributaries of the Kassai. The Congo river, which is about 2,500 miles long, is called at its source the Chambezi, and drains consecutively the four great lakes Bangweolo, Mweru, Tanganyika, and Leopold II. There is some reason to suppose that the drainage from Tanganyika by the Lukugu into the Congo is of recent date. The main river, at Matadi only a few hundred yards wide, is very broad in its middle reaches and studded with myriads of islands. In the section between Basoka and Bangala (Nouvelle Anvers), it varies in width from fifteen to over thirty miles. Many of its tributaries form excellent waterways for hundreds of miles, and vary in width from one to ten miles in the navigable portions. Of these the Kassai, Ubangi, and Lomami are larger in every respect than any rivers in Europe. Generally speaking, all the rivers of the Congo system have a different native name after passing some large physical feature, such as a cataract or lake, a fact possibly due to these natural barriers separating native races or kingdoms.

Taken as a whole the Congo basin consists of flat, high-lying tablelands. There are mountains only to the eastward where the river approaches the Atlantic, and, cutting through them, falls by cataracts to the level of the coast plains. In the interior of the Congo Free State there are no mountain ranges. More than half of the State may be said to consist of continuous forest, probably the largest tree-clad area in the world, not excepting even the Amazon and the Malay Archipelago. Throughout the forest, india-rubber trees grow in larger quantity than in any other known region. As far as is yet known there are only two large lakes, Leopold II. and Matumba actually within the Congo Free State;

but the western shores of Albert Edward, Tanganyika and Mweru form part of the eastern boundaries. Many points as to the geography of the interior are still very indefinite. Rumour has placed a large lake between the Lomami and Lake Leopold II., but it has not yet been discovered or localised. Much of the country is unapproachable by rivers in which canoe navigation is possible, and has therefore not yet been visited by Europeans.

In almost every part of the State iron is found in workable quantities. Copper is less profusely distributed, but the copper mines in the west between the Kassai and the Atlantic, and in Katanga to the south, are extremely rich. The iron and copper are worked by the natives, but up to the present time there has been no search for the noble metals, though the rocks which fringe the Congo basin on every side may eventually prove a fruitful field for the prospector.

Climate.—From the standpoint of European colonisation, the climate of the Congo is bad : all forms of malarial disease are rife owing to the moist heat. But with a better knowledge of tropical diseases, and of the precautions necessary to guard against them, such as the choice of sites for houses and stations, it may be possible for Europeans to settle in the country. Hitherto, the State officials and others have had to live in a most primitive manner since, owing to the difficulties of transport, luxuries, comforts, or even medicines, have been almost unobtainable. The high death-rate of Europeans in the Free State should therefore not be taken as an argument against the attempt to develop the country. The temperature averages about 80° in the shade over the greater part of the country, and during several months in the year violent storms or tornadoes of short duration are very prevalent, which sometimes cause a fall of 30° or 40° in temperature in half an hour.

Flora and Fauna.—The flora and fauna differ in many respects from those of any other country within the same degrees of latitude. In the forest are found ebony, teak, oil-palm and mahogany of good quality, besides many other useful and ornamental woods. Wild coffee, india-rubber, creepers and cotton abound throughout the whole forest region ; as do also yams, plantains, papaw and pine-apples. The vegetables cultivated in the country are cassava, maize, rice, pea-nuts, sweet potatoes, bananas, beans, sorghum (Kaffir corn), tobacco and coffee. Immense herds of elephant are found in every part of the Congo Free State, and leopards, buffalo and wild cattle inhabit the plains. A great variety of fish, as well as hippopotami and crocodiles swarm in all the rivers.

People.—There are at present over 100 tribes recognised in the Congo basin, but it is possible that as many more are to be found in the yet unexplored regions. Nearly all speak Bantu dialects, and most of them have been, or are cannibals. None of the tribes are so dark in colour as the Sudanese. Each tribe or race is governed by a chief whose power is absolute ; and large tribes are divided into sections under petty chiefs, who

have complete control in their own districts, but are subservient to the great chief who holds the power of life and death over them in common with all his subjects. Some tribes have absolutely no form of religion, while among the more superstitious races fetish worship, or propitiation of evil powers, exists. As a consequence the "witch doctor" is a power amongst them second only to the chief. The natives in several parts of the country are clever workers in iron, copper and wood. In certain districts such as the Kassai, they weave beautifully ornamented cloths from the palm and other fibrous plants.

Means of Communication and Trade.—The great rivers on the plateau have become the highways of trade, the numerous steamers employed being supplied with wood for fuel from the forests on the banks. The cataracts of the Congo have been the chief obstacle to the development of the country, since transport on the road constructed around them was both difficult and costly. As a result of many years labour in the face of the greatest difficulties, a railway, 250 miles in length, has been built from the extremity of the navigable portion of the lower river, at Matadi, to Leopoldville on Stanley Pool, the base from which the internal trade is carried on. After Stanley had opened the way, the Arab trading chiefs of the east coast—who dealt mainly in ivory and slaves—led many expeditions into the Congo basin, using porterage for transport, the native porters each carrying a load of about 60 lbs. The river trade by steamers and canoes now carries practically the whole available export produce of the State to the west coast. These exports are ivory, rubber, palm-oil, orchilla-weed, several kinds of gum, pepper and coffee. Steamers on the Lower Congo carry on direct trade with Antwerp and Liverpool.

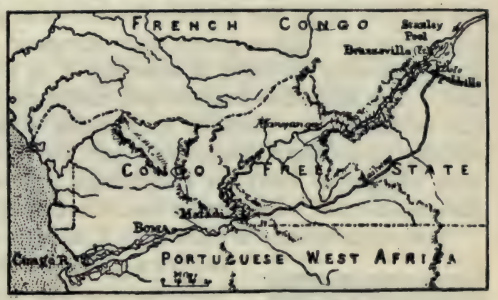

FIG. 463.—*The Congo Railway.*

History and Government.—All efforts to explore the Congo from the sea or to discover whence its vast volume of water was derived were without effect, and the existence of the great inland course of the river was unknown until, in 1876, Sir. H. M. Stanley struck its upper waters in East Africa and followed the river to the Atlantic Ocean. On the initiative of Leopold II., King of the Belgians, a society called *Comité d'Etudes du Haut Congo* was formed in Brussels in November, 1878, with the object of exploring and exploiting the basin of the river Congo, the vast size and importance of which had just been revealed. In 1879, Stanley, accompanied by fifteen Europeans, returned to the Congo, his first aim being to make a practicable road through the cataract region to the upper river.

At Vivi, the highest point of the river navigable from the sea, he established a station directly below the last of the cataracts, and made his road along the right bank nearly due north to Isanghila, after which it took an eastward course, following the river as closely as possible to Manyanga, where he crossed and proceeded up the left bank to Stanley Pool. Here he established the station now known as Leopoldville. At Stanley Pool a steamer was soon launched, and the difficulty of communication with the interior was thus greatly reduced, since from Stanley Pool to Stanley Falls, 1,000 miles further up the main river, steamers of comparatively large size can voyage in safety at all seasons of the year. Mr. Stanley spent five years in the work of exploration, and soon after his return to Europe the society became merged in the *Association Internationale Africaine.* In 1885 the Berlin Congress guaranteed the Congo Free State as a Sovereign Power, and the King of the Belgians—who had borne all the expense from the commencement—was proclaimed sovereign. Five years later the Belgian government advanced a small loan to the embryo State, reserving the right of annexing it as a Belgian colony at a future date. The Arab slave-traders, who raided the western part of the country, had for many years rendered the position of the few Europeans at remote stations exceedingly dangerous; and the military forces of the State were obliged to carry on a campaign against them before the evil influence exercised on the more peaceful natives was destroyed.

The administration of the Congo Free State is carried on by a Governor, two Vice-governors, three Inspectors, and sixteen Sub-commissioners—one for each of the sixteen districts into which the country is divided. These are Banana, Boma, Matadi, the Cataracts and Stanley Pool on the lower river; and on the upper river and its great tributaries, Kassai, Equator, Bangala, Ubangi, Aruwimi, Welle, Stanley Falls, Kwango, Lualaba, Arab Zone, Kasongo and Luluaberg. *Boma,* the seat of the administrative government, is an active seaport; and *Leopoldville* on Stanley Pool is its commercial complement as a river port. Many of the native villages in the interior straggle for miles along the river banks; but anything like a correct estimate of their population is as yet impossible. The total population of the State has been variously estimated; but since a great part of its vast area has not yet been explored it is hardly possible to say more than that the Congo Free State is well peopled.

FIG. 464.—*The Flag of the Congo Free State.*

STATISTICS.

(*Rough Estimates.*)

Area of the Congo Free State (square miles)	900,000
Population „ „ „	30,000,000
European population (1897)	1,474
Population of Boma	10,000

ANNUAL TRADE OF THE CONGO STATE (*in dollars*).

Exports (1895–96)	2,800,000
Imports „	2,800,000

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VIII.—PORTUGUESE WEST AFRICA

By Captain Ernesto de Vasconcellos,[1]
Portuguese Royal Navy.

CAPE VERDE ISLANDS

Position and Surface.—The Cape Verde archipelago is situated in the North Atlantic, 400 miles off the west coast of Africa between 12° and 15° N. It is composed of fourteen islands and islets, divided into two groups, which, owing to the prevailing north-east trade winds, are named respectively, Windward (*Barlavento*) and Leeward (*Sotavento*). The Windward group includes the islands of Santo Antão (St. Antony), São Vicente (St. Vincent), Santa Luzia, São Nicolão, Boavista, and Sal; the Leeward islands are São Thiago (Santiago), Mayo, Fogo and Brava. The islands present an arid aspect from the shore, but in the interior, along the banks of the streams, there is a fairly rich vegetation, especially in rainy years. The islands are volcanic and all contain craters and recent eruptive rocks. The volcano on Fogo, 10,560 feet in height, which was last in eruption in 1857, the volcanic plateau of St. Antony whence a peak of 7,550 feet rises, and the Antonia Peak of 4,870 feet on Santiago, are the most remarkable features.

Climate and Resources.—The climate is better than might be expected from the latitude. The archipelago is situated in the trade wind zone; the north-easterly wind blows from November to July, the *Tempo das Brizas* (Time of Breezes) and naturally the healthiest season. From August to October the *Tempo das Aguas*, or rainy season, prevails, and this is the hottest and least healthy part of the year. During the breezy season the temperature is about 73°, and in the rainy season about 79°. Coffee is the most important product of the Cape Verde plantations; the physic-nut (*Jatropha Curcas*) is more productive here than in America, and grows on all the islands; cereals and sugar-cane are cultivated. Salt, coral, and dried fish, are also of some importance. In the fauna there are neither wild animals nor venomous reptiles. Most of the vertebrates were introduced by the Portuguese colonists. The only

[1] Translated from the Portuguese.

industries worth mentioning are the making of straw articles in Brava, and embroideries and lace in Fogo.

People and History.—The Cape Verde Islands were discovered by Cadamosto in 1456, and first peopled in 1640 by the servants and retainers of the Infante D. Fernando, who took there colonists from Alemtejo and Algarve and obtained negro labourers from Guinea. These elements form the foundation of the present mixed population containing more or less European blood. The colony is under a Governor appointed by the central government in Lisbon. There is a subordinate administration in each island. The principal town is *Praia* on Santiago, the residence of the Governor, and capital of the colonial province. *Mindello*, inside Porto Grande on St. Vincent, which is considered the second town of the archipelago, has an excellent harbour, and is a very important coaling station. Both of these are placed in connection with the Atlantic submarine cables.

STATISTICS.

	1896.
Area of the Cape Verde Islands in square miles	1,480
Population „ „	114,000
Density of Population per square mile	77
Population of Praia	4,000
„ Mindello	4,200

PORTUGUESE GUINEA

Position and Surface.—Portuguese Guinea is an enclave in the French West African possessions some distance south of the Gambia River. The littoral is formed by lowlands cut up by numerous water-courses and inlets of the sea. Laterite is formed on the barriers near the coast, and the whole possession consists of undulating country nowhere becoming mountainous. The Geba and the Grande are the principal rivers falling into a wide estuary from which a remarkable tidal bore ascends the Geba, and in the mouth of which lie many islands, the most important being the Bijuga or Bijagos group. These and most of the other Guinea rivers are navigable. On their banks there are forests of valuable timber trees, including mahogany.

Climate and Resources.—The climate is generally unhealthy for Europeans, especially during the April and November rains, when the mean temperature is about 90° F.; the more favourable dry season lasts from December to the beginning of March. Portuguese Guinea is an agricultural and commercial colony. In the littoral zone, rice and maize are grown as the principal food of the natives, who, with the exception of a few warlike and nomadic tribes, are employed in agricultural pursuits. The most important products are pea-nuts, india-rubber, wax, tobacco, indigo and cotton. The kola tree (*Sterculia accuminata*) occurs on the banks of the Geba. Coffee, palm-trees, and all leguminous plants flourish. The fauna includes antelopes, the elephant, panther and many monkeys, while termites abound and are destructive to buildings. Cattle, sheep,

goats and pigs are kept as domestic animals. The natives of Guinea belong to ten different races, which are subdivided into many tribes. The highest races are the Fula, Mandingo, and Biafada, who are constantly engaged in war with each other. The history of the movements of these people is given elsewhere. As a general rule the Fulas are the most numerous and bravest of all the Guinea tribes. The Bijagos inhabit the Bijagos Islands between the Orango and Geba channels; and live as a rule on the produce of the sea. The capital of Portuguese Guinea is *Bolama*, on one of the islands, but *Bissao*, on the shore of the great estuary, is the commercial centre. There are about 67,000 inhabitants in the possession.

PORTUGUESE ISLANDS IN GULF OF GUINEA

São Thomé and Principe.—The islands of Principe and São Thomé (Princes Island and St. Thomas), lie in a straight line with Fernando Po and the Peak of Kamerun, almost bisecting the Bight of Biafra. They constitute a province under a Portuguese Governor. São Thomé is nearly on the equator, 150 miles west by north of Cape Lopez. It has an area of 320 square miles, with a population of 22,000. The littoral zone, covered by dense tropical vegetation, leads up to remarkable mountain peaks of volcanic origin, rising in São Thomé Peak to 7,020 feet. The only commercial port is Anna de Chaves, where the town of *São Thomé* is situated. The dry season lasts from June to September, and is the best of the year; the rainy season occurs between September and June. In the lowlands the temperature ranges from 66° to 81° F.; in the middle zone from 57° to 68° F., while on the highest cultivated land the cold is felt to be unpleasant. The people inhabiting these islands are a mixture of the ancient Portuguese colonists named Creoles, speaking a language somewhat similar to the Cape Verde creole, and labourers under contract from various parts of the African continent. The Angolares, inhabiting the south-east coast of the island near Angra de São João, were originally the survivors from an Angola ship lost on the Sete Pedras Bank.

FIG. 465.—*The Islands of the Gulf of Guinea.*

The island of Principe, 90 miles north-east of São Thomé, has an area of only 44 square miles and a population of 2,700. It is covered by even more luxuriant vegetation than São Thomé, but does not possess the alpine species of that island, as the greatest elevation, the Peak of Principe, only reaches 2,720 feet. There are two natural harbours, of importance on account of their size, *Santo Antonio*, the commercial port and seat of the

custom house and local government, and the Bay of Agulhas on the west coast, which has not yet been utilised. The climate is warmer than that of São Thomé and with a greater rainfall.

The products, which make this colony one of the best in West Africa, are : cacao, coffee, cinchona, vanilla, india-rubber and balsam-trees. The species yielding timber are varied and rich. Commerce is entirely carried on by Portuguese ships with the mother country.

ANGOLA

Position and Extent.—The colonial province of Angola, exposed to the South Atlantic, has a stretch of coast line of 1,020 miles from the Congo to the river Cunene. It is bounded on the north by French Congo and the Congo Free State, the latter also forming the boundary on the east ; on the south by German South-West Africa, and on the south-east by British Central Africa. It is the largest of the Portuguese colonial possessions.

Surface.—The coast lands are low in the north crossed by hill-spurs, and high in the south where the edge of the African plateau approaches the sea. There are numerous natural harbours, some of which, such as Loanda, Lobito, Mossamedes, Port Alexander, and Bahia dos Tigres (Great Fish Bay) are particularly good. Angola is an elevated territory, the great mountain ranges of the edge of the plateau following the curves of the coast. On the north an extensive mountain range forms the watershed between the numerous rivers flowing west to the Atlantic and those flowing north to the Congo, including the great streams of the Kwango and Kassai. The south of Angola is a great plateau descending abruptly towards the sea, forming the "Chella" whence numerous torrents swell the rivers flowing to the ocean. The plateau of southern Angola has an altitude of between 6,500 and 5,000 feet ; the highest peaks are found in the Bailundo regions south of the Kwanza, where the Lovili mountains reach 7,800 feet and the Elonga mountains 7,500. The geological features of Angola, as far as known, include the sandstones of the Congo basin and a part of the ancient schistose zone of West Africa. Cretaceous strata occur between Great Fish Bay and the river Dande, with some exposures of Tertiary (Miocene) rocks. Eruptive rocks occur in the Mezas mountains in Mossamedes. The province is crossed by numerous rivers, many of which are navigable on their lower and middle courses. They belong to five great hydrographic basins : that of the Congo draining the interior of the northern half ; the Kwanza entirely within the colony ; the Cunene, which forms the southern boundary and drains most of the healthy Benguela and Mossamedes plateau ; the Cubango in the south, which flows to the inland Lake Ngami ; and finally the Zambezi, draining the entire south-east of the colony up to the Katima rapids.

Climate, Resources and Trade.—The cool ocean-current flowing

along the coast from the south, together with the regular sea breeze, modify the heat natural to the latitude, especially in the south of the colony. In the north and centre, on the coast lowlands and along the rivers, malaria is endemic ; but on the highlands of the interior comparative comfort is enjoyed, and on the Benguela and Mossamedes plateau the climate is similar to that of the south of Europe. At São Salvador do Congo in the north of the province, at an altitude of 1,800 feet, the mean temperature observed during four years was 73° F. In Loanda the mean temperature during eleven years was 74·5°, and in Caconda, on the plateau, about 67°. The cool season (*Cacimbo*), lasting from June to September, is the pleasantest part of the year ; the rains begin in October and reach their maximum in April, severe thunderstorms being common during the last three months of their duration. The prevailing sea winds from the west-south-west are called "viração," in distinction to the land winds which are called "terraes." In the north, as far as the Kwanza valley, the chief characteristic of the vegetation is a mixture of savannas and groves of oil palms (*Elæis Guineensis*) ; the savanna region proper occupies the river valleys and the plateaux ; and finally there is a coast strip of poor and scanty vegetation and an arid zone near Mossamedes, in the south, where a desert flora is found. In all these regions up to an altitude of 3,500 feet, and on the river banks, the baobab is found ; and the sea is fringed with the mangrove (*Rhizophora Mangle*). Angola exports the produce of its numerous plantations, especially vegetable oils, india-rubber, wax, coco-nuts and coffee. Its commerce is carried on with Portugal and other Portuguese colonies.

People and History.—It is not as yet easy to give the necessary data for the study of the people of Angola, but it seems that the first people who inhabited the country were the Bushmen, successors of the Pygmies now represented by the Ba-cancale , Ba-cuisso, Ba-coroca and others mentioned by Capello, Ivens, and Serpa Pinto. They are met with, living in isolated communities, in the south of the province. In the centre and north are the Jagas, invading tribes from the north-east represented by the Bangalas ; but the Angola Bantu may be divided into Fiotes in the north, from Chiloango to the Dande ; the Bundas from the Dande to the Kwanza, and the N'Bundos in the south up to the heights of Mossamedes. Angola was discovered by the Portuguese explorers of the fifteenth century ; the mouth of the Congo was reached by Diogo Cão in 1482 ; and Diaz, in 1488, sailed along the whole coast. By the beginning of the sixteenth century the Portuguese had important settlements at several points.

FIG. 466.—*The Loanda-Ambaca Railway.*

Government and Towns.—The colonial province of Angola, under a Governor-General, is divided into the districts of Congo north

and south of the Congo river, Loanda, Benguela, and Mossamedes, bordering the coast, and Lunda in the extreme north-east. The capital is the city of *São Paulo de Loanda*, usually known as *Loanda*, a great seaport, with a railway running inland through rich plantations for 200 miles to *Ambaca*. The principal towns besides the capital are *Cabinda* in the Congo district, *Ambriz*, *Benguela*, and *Mossamedes*, all on the coast.

The extent of the trade carried on between Portugal and the Portuguese possessions along the west coast of Africa may be judged from the statistics of 1895, which show $9,850,000 of colonial exports to the mother country, and $8,700,000 of imports from it.

STATISTICS (*approximate*).

Area of Angola province in square miles	457,500
Population „ „	2,000,000
Density of population per square mile	4·4
Population of Loanda	14,000

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CHAPTER LII.—SOUTH AFRICA

I.—THE COLONY OF THE CAPE OF GOOD HOPE

By Thomas Muir, C.M.G., LL.D., F.R.S.,
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and F. C. Kolbe, D.D.

Position.—The outline of the continent of Africa being familiarly compared to a leg of mutton, Cape Colony may be said to occupy the shank end of it: indeed, "the shank end" is a common nickname for the south-western corner in which Cape Town stands. The northern boundary of the colony was until recently the natural line of the Orange River, but now the territory stretches northward into Bechuanaland, between the German possessions on the west and the two Boer colonies on the east. By means of this extension, and by means of the Bechuanaland Protectorate to the north of it, and Rhodesia still further north, the trade route to the interior lies entirely within British territory. Basutoland and Natal, lying eastward of the Orange River Colony, complete the north-eastern boundary. Separated from the rest of the colony, and almost surrounded by German territory, is a small tract of land around Walfish Bay, the only natural harbour of any importance between Angola and the Orange River.

Coasts.—The seaboard is strangely inhospitable: the harbours are mostly unprotected, and the river-mouths are choked by sand-bars. The one good natural harbour on the west—Saldanha Bay—has hitherto lacked fresh water, though it is proposed to bring a supply from a distance, and so develop the port. At the south-western corner the Cape Peninsula is a striking feature, consisting of Table Mountain facing north, buttressed by a range running southwards, and separated from the mainland by a strip of sandy plain (Fig. 471). In front of Table Mountain, to the north, lies Table Bay, a port which has been robbed of its terrors by a break-water and capacious docks; and eastwards from the peninsula stretches False Bay, in a snug corner of which, named Simon's Bay, there is a British naval station. The only other important harbours are (in order) Mossel Bay, Algoa Bay and East London. Algoa Bay, in spite of being an open roadstead, is yet so favourably situated for the main trade route, has so thriving a province immediately behind it, and is so well equipped for the receipt and discharge of goods, that its town, Port Elizabeth, justly claims the title of "the Liverpool of South Africa."

Configuration.—The direction of the mountain range which forms the main watershed of South Africa may be roughly indicated by a line drawn

parallel to the coast about 150 miles inland. Inland of this line the great continental slope trends to the west, as is indicated by the many tributaries which go to swell the Orange River; and on the coast side of the range countless rivers and torrents (when there is rain) struggle through the minor mountain defiles on a short and rapid journey to the sea. During the greater part of the year, when there are no heavy rains, many of these rivers are without water, and only dry beds may be seen. The minor mountain ranges are also regularly distributed, running east and west, one of them half way and the other three-quarters of the way between the watershed and the coast; and these too, of course, give origin to their own little streams. Thus the rise to the continental plateau is by well-marked stages; first the shore-slope, then the Little Karroo, then the Great Karroo, and finally the High Veldt. Generalising widely, it may be said that the west coast region consists of barren and rainless tracts of sand; that a wide band lying along the eastern edge of this tract, and having its base from Cape Town to Port Elizabeth, stretches first through fertile mountains and valleys, then through wide plains of scrubby bush, and finally across immense grassy prairies which merge insensibly into the forests of northern Bechuanaland and Rhodesia; and that on the east of this band the verdant undulations of Kaffraria stretch over and beyond the Kei for hundreds of miles, and break up eventually into the tumult of the Basutoland hills and the diversified surface of Natal.

FIG. 467.—*The Mountain System of South Africa.*

Geology.—Geologically South Africa may be regarded as consisting of a central basin of younger rocks surrounded by a belt of older formations, which is incomplete on the eastern coasts. The older rocks comprise a vast series of slates and schists with much intrusive granite in the south-west and to the north, separated by a distinct unconformity from succeeding sandstones, quartzites, and shales. The Table Mountain sandstone is the most important formation of this series, as it forms all the chief mountain ranges in the south-west of the colony, while the auriferous conglomerates of the Transvaal are usually assigned to it. The Central Basin is bounded by a curious series of conglomerates collectively known as the Dwyka conglomerate, which contains striated boulders probably of glacial origin. Within the conglomerate belt lies a vast thickness of gently folded shales and sandstones, the lowest known as the Ecca beds, to which succeed the Karroo and Stormberg beds. The Karroo beds are interesting as yielding peculiar reptilian remains and having a

considerable number of diamantiferous pipes, especially near the border of Cape Colony and the Orange River Colony, while the Stormberg beds are conspicuous as the South African coal-bearing formation.

The whole of the peripheral area is much contorted, flexured, and faulted; and, as a result of one of the faults on the south, an area built up of the younger Ecca beds remains, which points to a former much greater extension of the more recent central formations. The entire region has suffered enormous denudation; and, as many of the formations, especially towards the interior, consist of beds lying almost horizontally, table-like mountains are extremely common.

Climate.—The variation of climate in Cape Colony is dependent on rain rather than on temperature, the latter having a comparatively moderate range. Thus along the sea-coast the thermometer averages 60° F. in the coldest month and 70° in the hottest. During the colder season the isothermals run east and west, in the summer time north and south.

There seem to be three regions of rainfall: the Eastern, which gets its rain in the hot season; the South-western, with its rainfall in the winter; and the North-western, with practically none at all. This arrangement may be explained by the direction of the prevailing winds and of the mountain ranges. The chief wind in summer is the south-eastern, which is the rear-guard of the trade wind strengthened by the monsoon effect of the hot central regions. In the south-west there is little to check its career as it hurries with its moisture to the tropics and reveals itself as a rain wind only by clouds on the mountain tops. In the east, however, it has to ascend over the watershed and much moisture is precipitated in the process. In winter, on the other hand, the winds are from the north-west, and those that come directly from the sea drop their rain at the south-western barrier of mountains, while those that reach the east get there unladen. The high and dry air of the Karroo, and the regularity and moderate character of the seasonal changes, have caused Cape Colony to be increasingly regarded as a desirable health resort, though some complain that long residence has a slightly enervating effect.

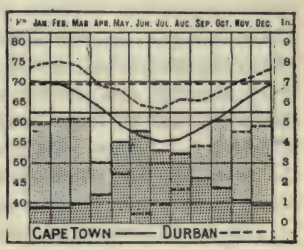

FIG. 468.—*Temperature and Rainfall of Cape Town and Durban.*

Resources and Industries.—The chief farm products are wool, mohair, skins, grain (wheat, mealies, Kafir corn, &c.), wine, and brandy, with a minor yield of ostrich feathers and tobacco. Fruits of all kinds grow readily, but they have only lately begun to be systematically cultivated. At the census of 1891 there were in the country 2¼ million cattle, 23 million sheep and goats, and 155,000 ostriches. In that year the yield of wheat was 2¾ million bushels, and of mealies and other grain 4¼ million bushels. Tobacco was produced to the extent of 11,000,000 lbs., but

it has not yet reached a high level of excellence. The total yield of wine was 6 million gallons, and of brandy 1½ million; the latter is, as a rule, very inferior, and but little of the former recommends itself to connoisseurs. The facts that Cape grapes have a very large proportion of sugar and that the pressing has to be done in the hottest time of the year, militate against success in the production of high-class wines.

The mineral wealth of the country consists predominantly of diamonds. The seventy square miles at Kimberley, owned by the De Beer's Company, form the richest diamond mine in the world, with an output of some 3½ million carats per annum, representing a value of about $22,500,000. There are also valuable and interesting copper mines in Namaqualand near the mouth of the Orange River. A fair supply of serviceable coal is found at the northward bend of the watershed. Of other metals and minerals there are samples enough to raise many hopes.

Flora.—South Africa is peculiarly rich in plant life, about one-sixth of the genera of the whole world being found in it, and 142 natural orders are represented. European gardens have been enriched by many pelargoniums, heaths, proteas, irises, lilies, and orchids native to the Cape. There seem to be five different floral regions in Cape Colony, between which the watershed is the dominant dividing line. To the south of it there are two, one in the south-west and south of the Colony, and one stretching almost from Port Elizabeth, through the Transkei and Natal into tropical Africa. On the other side of the watershed there are the Karroo region and the Kalahari region, both centrally situated, and a Composite region towards the north-east.

The South-western region is the special home of what is known everywhere as *Flora Capensis*, including all the flowering plants enumerated above. The silver tree and, among orchids, the *Disa grandiflora* are famous, and everlasting flowers form a notable export. The arum lily is the commonest wild flower. The aloe grows freely, and in the south central forests many valuable timber trees are found, such as the yellow-wood and Cape mahogany. Oaks, pines, and many other trees have been introduced, and are easily cultivated, but the pine is almost the only tree that holds its own without help against the native plants. The region has a remarkable affinity to south-western Australia, and many Australian trees, especially gums, have been successfully introduced.

The Tropical region is characterised by dense bush and forest, such as the Addo bush in the Eastern Province. Here the whole country is greener and more luxuriant, and many trees have splendid foliage and showy flowers. Euphorbias are common, and the palm begins to appear.

The Karroo region, being one of great dryness and subject to extremes of heat and cold, presents a general appearance of scattered shrubs on bare or stony soil. A species of acacia is the only tree in the whole region, and even that is not very abundant. Yet after a heavy rainfall the appearance of the country improves with astonishing rapidity, and its occasional

evanescent beauty has to be seen to be believed. The plants, having to struggle for existence, protect themselves from drought by succulence and by thorniness from seekers after food.

The Composite region slopes to the north-east into the Orange River Colony. It consists of vast treeless plains of dry moorland and heath, with grassy patches here and there. It gets its name from the extraordinary predominance of *compositæ* in its flora.

The Kalahari region, in Bechuanaland, is principally a grass country, with isolated shrubs and trees.

Fauna.—The fauna of Cape Colony has been reduced by human agency to a mere remnant of what it formerly was, and it was never much differentiated from that of the rest of the continent. The physical aspect of the country accounts for the predominance of the ungulates among mammals : the elephant, the rhinoceros, the hippopotamus, the zebra, the giraffe, the buffalo, and more than thirty kinds of antelope, once occupied the land, and were preyed upon by the lion, the leopard, and other hunting animals. Most of the native animals have now been driven to the north or killed out ; the quagga is quite extinct, and the " white " rhinoceros nearly so. The birds are more remarkable for plumage than for song. Birds of prey are well represented. The stately secretary bird is strictly protected on account of its services against snakes. The ostrich has been domesticated. Of snakes there are not many varieties, but they are fairly plentiful, and the very worst vipers (*e.g.*, the puff-adder) are among them. Scorpions and spiders abound, and the insect world is of great and often unpleasant interest. Thanks to the cold current along the Agulhas Bank, there is an excellent supply of fish, which is being more and more utilised every year. Cured fish and tinned lobster are now articles of export.

Native Races.—As far as can be ascertained, the first inhabitants of South Africa were the stunted, yellowish-brown Bushmen, who lived by hunting only, a pursuit in which they trusted to poisoned arrows and to cunning rather than to strength. Their language abounded in clicks and deep gutturals. They were monogamists, but their cohesive power as a people was of the slightest. They were apparently proof against civilisation, and were it not that they have shown some signs of feeling for art in their rude cave-paintings, one would be inclined to assign them to the lowest grade of humanity. They have dwindled away before the progress of the white man, and now practically no longer exist as a people. The second arrivals, the Hottentots, brought hairy sheep and a kind of cattle with them. The first Europeans found them living along the west coast and the Orange River. The race is nearly all mixed now, but in their original state they were a flat-nosed, yellow people of medium height, pastoral but not agricultural ; with clicks in their language like the Bushman, but not harsh gutturals ; using poisoned arrows too, but with assegais and knobkerries as well. The present dominant native races of South Africa are of Bantu stock, and generally known as Kafirs. They have gradually made their way

southward within historical times. These people—the Zulus, Basutos, Fingos, Pondos and Bechuanas—are taller, stronger, and better formed than the earlier races, except on the west of the Kalahari desert, where the Damaras, who are Bantu, are inferior to the Namaquas, who are Hottentots. They have a high organisation of law, government, and discipline ; they add agriculture to their main occupation of keeping cattle ; they use clubs, axes, and shields as well as assegais and kerries ; and their languages are not only free from clicks (unless these have been introduced), but are governed by intricate grammatical rules and by principles of harmony of sound. The Bantu are amenable to civilisation, and some individuals among them have reached a high grade of education.

FIG. 469.—*Average population of a square mile of Cape Colony.*

Settlement.—While the southward movement of unsettled races was still going on by land, a competitive movement of Europeans began by sea. It was almost a chance whether the Portuguese, or the Dutch, or the English should first settle at the southern extremity of Africa. The Portuguese arrived first, rounding the Cape under Bartholomew Diaz in 1488, in the search for the sea-route to India. Not foreseeing that it would not always be necessary to hug the shore on the voyage to the East, they thought they were gaining the best chance of a monopoly by establishing themselves well to the north on the east coast. Some pioneer Englishmen claimed the Cape peninsula for the rule of James I., in the year 1620, but the Home Government was not alive to the importance of such a base for trade, and the Dutch seized the neglected opportunity. They arrived in 1652, and under such wise rulers as Van Riebeek and Van der Stel the little nucleus of a colony gradually pushed out its borders. In 1688 Huguenots, driven out of France by the Revocation of the Edict of Nantes, arrived in sufficient numbers and with sufficient energy to bring about a permanent change in the new country. This blend of French with Dutch has, in the course of two centuries, resulted in the formation of a perfectly distinct nationality which loves to call itself Afrikander, and it has developed out of the original Dutch language a colloquial dialect known as *Kaapsche Hollandsch*. The typical Afrikander —the South African Boer—is characterised by sturdy and courageous independence, a somewhat sensitive pride, a warm-hearted hospitality, and great attachment to old religious and domestic customs. He defends himself from the consequences of want of reserve by a quality which is too genial to be called cunning, but which he himself calls "slimness."

FIG. 470.—*The Arms of the Colony of the Cape of Good Hope.*

In 1806 the Cape of Good Hope passed into British hands. In 1820 the arrival of English settlers laid the foundations of prosperity in the

eastern division of the colony. Subsequently, various collisions with the indomitable Afrikander spirit, such as that which arose from the mismanagement of the Slave Emancipation Act, resulted in the great "trek" of emigrant Boers, which laid the foundations of the lately suppressed South African Republics. In 1872 Responsible Government was conferred on the Colony, and under this freedom the various races may in time settle into equilibrium, though the process has been impeded by the feelings once more aroused during the late war.

Railway System.—Since Cape Colony has no navigable rivers, and canals are out of the question, and even roads present serious difficulties, and since the centres of population are far apart, the development of a good system of railway communication is of the very first importance. This is still more evident in view of the fact that the Cape is largely dependent on its trade with the interior. From a purely topographical standpoint one would expect that commerce would find its way to Rhodesia and the Transvaal through ports on the west or east coasts, approximately in the same latitudes as these districts; but the development of Africa has proceeded on such lines that hitherto the Cape has had the advantage of the worn channels of trade. One contributory cause is the unhealthiness of the tropical seaboard. The routes of the main railway lines have consequently been determined by the necessity of keeping these channels open; so that from Cape Town, from Port Elizabeth, and from East London lines run northwards, intercommunicating by branches near the coal district, and then running in two parallel lines, one through the Orange River Colony to the gold fields of the Transvaal, and one past the diamond fields of Griqualand West through Bechuanaland to Rhodesia and the Zambezi, with a promise of early extension to Lake Tanganyika. Other lines bring Grahamstown, the city of the settlers in the east, and also Aliwal North, into communication with the main lines; and a longer loop diverges so as to join Port Elizabeth to Graaff-Reinet, "the Gem of the Karroo." Near Cape Town, a side branch runs to Malmesbury, the wheat district; and in the north-west a small line serves the copper mines of Namaqualand (Fig. 437). Other lines, now being made, will connect the east with the west.

Much of the trade of the colony, and of the shipping at Cape Town, is, in normal times, concerned with the transport of material to the Transvaal and the export of gold from the mines.

Divisions and Towns.—The political divisions of Cape Colony are not of much importance as such, but the broad distinction between East and West is more than merely nominal. The stream of English immigration, finding the West already occupied, was diverted chiefly to the East, thus largely altering the balance of nationalities. From time to time, indeed, there has been much agitation in the East for separation, but the feeling of common interest has up till now carried the day, and in spite of a little natural jealousy the claim of Cape Town to remain the capital of the

whole country is everywhere admitted. In population, *Cape Town* maintains its historical lead, being equal in this respect to the next three towns together, namely, Kimberley, Port Elizabeth and Grahamstown. Besides being the seat of government, it has the advantage of unrivalled residential charms in its suburbs; its situation at the foot of Table Mountain, flanked by the Devil's Peak on one side and the Lion Mountain on the other, entitling it to rank among the most beautifully placed cities in the world. Its population is very diversified; Dutch as well as English is freely spoken among the European inhabitants, and besides types of all the black races there are some ten thousand "Malays," descendants of Asiatics originally imported as coolies.

FIG. 471.—*The Site of Cape Town.*

Kimberley, founded as a mining camp in 1870, depends for its importance entirely on the diamond mines. Its site was originally of the most unpromising kind, and Kimberley fever had for a time an unpleasant notoriety. But now the town is well built, efficiently drained, and abundantly supplied with water. Like Mafeking, further north, it sustained a protracted siege during the war. *Port Elizabeth* had likewise to overcome the niggardliness of nature; its low hills were formerly covered with scanty bush or bare sand, but water has been brought from a distant river, and now its parks and tree-lined streets are pleasant to look upon. *Grahamstown*, once the chief town of what was called the Frontier, has lost much of its importance. It is neither a great centre of trade, nor has it mineral wealth in its vicinity. It is, however, beautifully situated in an amphitheatre of hills, and its climate is unrivalled.

The district of Kaffraria, between the Great Kei and Natal, may be separately mentioned as being still in a transitional state of government. Most of the land is in the hands of the natives, who are somewhat paternally ruled over by special magistrates. Pondoland, the south-eastern portion of this region, was not annexed to the colony until 1894.

Basutoland formed part of Cape Colony from 1871 until 1884. The natives, who, like many mountain-dwellers, are high-spirited above the average, revolted in 1879; and although the colonial government was able to maintain its authority, the subsequent friction was so great that the Imperial government found it best to turn the territory into a Crown Colony. Basutoland is sometimes called the Switzerland of South Africa.

STATISTICS OF CAPE COLONY.

	1875.	1891.	1898.
Area of Cape Colony, square miles	191,416	221,311	276,947

Population :—	Europeans.	Blacks.	Total.
Census of 1875 (whole Colony as then constituted)	236,783	484,201	720,984
Census of 1891 { Colony as in 1875	330,938	619,547	956,485
Census of 1891 { Whole Colony	376,987	1,150,237	1,527,224

ANNUAL TRADE (*in pounds sterling*).

	1873–77.	1883–87.	1893–97.
Imports	5,400,000	5,100,000	14,400,000
Exports	5,400,000	7,000,000	16,000,000
Export of Diamonds[1]	1,550,000	3,160,000	4,140,000
Export of Gold[2]	25,000	33,000	7,925,000
Other Exports[3]	3,825,000	3,807,000	3,935,000

DESTINATION OF ONE YEAR'S IMPORTS.

Merchandise entered for consumption in 1897	Total.	For Cape Colony.	S.A. Republic.	Rhodesia and B. Bechuanaland.	Orange Free State and Basutoland.
	£16,095,000	£9,870,000	£4,600,000	£570,000	£1,055,000

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II.—NATAL

By the Right Hon. James Bryce, O.M., F.R.S.

Position and Divisions.—The British colony of Natal lies on the coast of the Indian Ocean, between Cape Colony and Basutoland on the west and the Portuguese territories on the north-east, being bounded on the north by the Orange River and Transvaal Colonies. Apart from an area lately detached from the latter, it consists of three districts—Natal proper, Zululand, and Tongaland, which it is more convenient to describe separately, as their economic and social conditions differ.

Natal Proper.—Natal proper is, with the exception of the level strip along the coast, only a few miles wide, a hilly country, nearly all of which is over 2,000 feet above sea-level, while some of the mountains attain 7,000 feet. On the frontier of Basutoland a few points are still loftier, approaching 11,000 feet. The ground rises pretty uniformly from the coast northward, and along the line of the Orange River Colony it touches the central watershed of South Africa, which is here the outer or south-eastward rim of the great central plateau. Except on the Basuto frontier the mountains are usually rounded

1 The staple export of the Colony. 2 In transit from the Transvaal.
3 Illustrating the stationary condition of all exports of the Colony except gold and diamonds.

in their outlines, and covered with grass. The valleys are often wide and open, but there is very little level ground, and no extensive plains, such as are met with on the great inland plateau, or along the shore of the ocean further north. The climate is damp along the coast, but becomes constantly drier as one goes inland; for nearly the whole of the rainfall comes from the south-east, and most of it is received by the hills towards the ocean. The rainfall, which is 42 inches at Durban, on the sea (Fig. 468), diminishes to 30 inches in the highlands of the north close to the Transvaal border. The heat of the coast strip, moderated by the south-east trade-wind which blows steadily for most of the year, is somewhat greater than the latitude would explain, and seems to be largely due to the influence of the warm Moçambique current. The climate is on the whole a very healthy one, for its dryness prevents the heat from being enervating to Europeans, and the winters are cool; indeed in the northern highlands they are sometimes severe, and heavy snow-falls are not uncommon.

Resources of Natal.—The fauna of Natal differs little from that of the eastern parts of Cape Colony. The flora resembles that of the eastern region of Cape Colony rather than that of the more lofty and arid Transvaal and Orange River Colonies. It is only on the coast strip that vegetation is luxuriant, and such crops as sugar, rice, bananas, and pine-apples can be grown. But the rainfall is sufficient to give herbage on the mountains, so that the proportion of arid desert land is small. The valleys, especially in the southern and western districts, are often well wooded, while in the northern highlands few trees are seen, except stunted acacias and willows. Probably no part of South Africa has so large a proportion of its surface available either for tillage or for pasture. Nearly all of it is now in pasture, and the chief occupation is the rearing of cattle and sheep. This is owing partly to the thinness of the white population, partly to the fact that in many of the inland valleys costly irrigation works are desirable, if not absolutely necessary as a security against the droughts. Tea is grown on the hills towards the coast, while cereals, especially maize, and tobacco do well in the inner valleys.

Gold has been found, but the reefs are little worked, and silver, copper and lead also exist. The mineral of most importance is coal, of which there are extensive beds. It is largely worked round the villages of *Newcastle* and *Dundee*. In point of quality it is inferior to the best European or American coal, but equal to any that has been found in Africa. Considerable deposits of iron exist close by, and promise a successful development of iron industries whenever it becomes cheaper to make iron goods than to import them. There are at present no manufacturing industries of any importance, and no places large enough to be called towns except *Durban*, practically the only seaport, and *Pietermaritzburg*, the capital.

People of Natal.—Of the white inhabitants fully two-thirds are of

British, and less than one-third of Dutch origin. Nearly all can speak English, but Dutch is used to some extent, especially in the North. The native Kafirs are mostly heathen, live under their own headmen, and preserve most of their native customs. They are now usually quiet and peaceable. Few can speak any language but their own, the Zulu tongue being that of the majority. Indians, who are largely Mohammedans, have recently immigrated either from Zanzibar and other ports on the East African coast or from the western provinces of India. Many are gardeners, cultivating fruit farms on the south coast; others are indentured coolies, at work on the sugar plantations for a term of years, and others have become mechanics or small shopkeepers in the towns. A law has been passed for the exclusion of all immigrants unable to write a letter in European characters. There is little or no intermarriage between the black and white races, who, however, live quietly together.

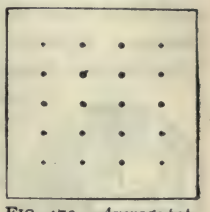

FIG. 472.—*Average population of a square mile of Natal.*

History and Government.—Natal was discovered by Vasco da Gama on his voyage to India in 1497, and received its name because it was first seen on Christmas Day. The Portuguese, however, did not claim it, and it remained untouched by Europeans till a few Englishmen established themselves at the harbour then called Port Natal (now Durban) about 1824. The British Government was at that time unwilling to acquire new African territory which might involve them in fresh wars. The ferocious Chaka, king of the Zulus, had shortly before ravaged the country, slaughtered a large part of the native inhabitants, and left most of it vacant. This fact, together with its reported advantages of soil and climate, came to the knowledge of the Boer emigrants who had quitted Cape Colony (in disgust at the proceedings of the British Government) in 1836, and led a large body of them to cross (in 1838) the passes from the great interior plateau and occupy the valleys in the centre of Natal. They defeated the Zulus and set up a republic—which they called Natalia, and built the town of Pietermaritzburg. The British Government, however, following the advice of the Governor of the Cape, conceived that no independent State ought to be suffered to establish itself on the coast, and accordingly dispatched to Port Natal a force, which, after a short war, compelled the Boer emigrants to leave or submit. At first a dependency of Cape Colony, Natal was created a separate colony in 1856. Meanwhile immense numbers of Kafirs flocked in, especially from the north and east, and though the number of whites increased steadily, the proportion of Kafirs to whites has continued to be about ten to one. Zululand was conquered in a war with the native king Cetewayo in 1879, and in 1887 (after a part of it had been occupied by freebooters from the Transvaal, and detached from the rest of the country) was declared to be British territory. In 1893 responsible government was granted to the colony, and

in 1896 Zululand and Tongaland were incorporated with it. The northern part of the colony was the scene of important military operations during the earlier part of the Boer War (1899–1902), the chief feature of which was the defence and ultimate relief of Ladysmith. The government is, as in the other self-governing British colonies, in the hands of a Governor sent from home (whose functions resemble those of a constitutional king), and of a legislature with a Cabinet responsible to it. There are two Chambers—a Legislative Council of eleven, and an Assembly of thirty-seven members; the former appointed by the Governor for ten years, the latter elected for four years by the people on a franchise which is (for whites) almost universal. All Kafirs and Indians are unenfranchised.

FIG. 473.—*The Badge of Natal.*

The customs tariff is lower as regards most articles of import than that of the South African Customs Union, which Natal has not entered. The chief exports are wool, sugar, hides and maize. The railway lines (600 miles in length) belong to the State, and run through from Durban to the Transvaal and Orange River Colonies. Elementary education is provided by the State for all white people, and by the mission schools for a certain, though relatively small, part of the blacks. There is no university.

Zululand.—Zululand is divided by the Tugela River from the rest of Natal, of which it now legally forms a part. The population is nearly all Kafir. Except a plain along the coast, which is hot and generally unhealthy, it is a high country, though hilly rather than mountainous, with no point reaching 5,000 feet, and very little land above 3,000. The higher parts are grass-covered, and furnish some of the best pasture-land in South Africa. Gold has been found, and the reefs are believed to be very promising, but neither they nor the other mineral deposits thought to exist (including coal, iron and silver) have as yet been carefully examined. The natives live under their tribal chiefs, preserving their primitive usages, and though brave and warlike, they have of late years been quiet.

Tongaland.—Tongaland is a strip of country mostly flat, and in many places marshy and unhealthy (since the heat is great), which stretches along the coast northward from Zululand to the frontier of the Portuguese territories, between Swaziland and the Indian Ocean. It consists of several petty principalities under native chiefs, who have at various times within the last few years (the last of them in 1894) been brought under British protection. The Tongas are a branch of the Bantu family, who speak a language quite different from that of their neighbours the Zulus and Swazis (the latter being near of kin to the Zulus). They are less martial than the Zulus, but generally similar in their customs. They are nearly all heathen, and no whites, except a very few missionaries, live among them. So far as is known their country has no great economic value, and it has no deep-water port. The people have been studied most in the adjoining parts of Portuguese East Africa, where the Ba-Ronga are a Tongan tribe.

STATISTICS OF NATAL.

	1879.		1891.[1]
Area of Natal, square miles (estimate)	21,150	..	32,500
Population	361,587	..	724,283
White population	22,654	..	47,888
Density of population per square mile	17	..	23
Population of Durban	17,127 (1884)		25,512
„ Pietermaritzburg	14,231	„	17,500

ANNUAL TRADE (*in pounds sterling*).

	1871–75.		1881–85.		1891–95.
Imports	940,000	..	1,900,000	..	2,920,000
Exports	815,000	..	900,000	..	1,323,000

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III.—SOUTHERN RHODESIA AND BECHUANALAND

By F. C. Selous.

British South Africa.—The British possessions on the great table-land of South Africa, outside the two self-governing colonies of the Cape of Good Hope and Natal, and the recently annexed Boer colonies, extend northward to the boundaries of the Congo State and the southern shore of Lake Tanganyika, with the Transvaal, Portuguese East Africa and British Central Africa on the east, and German South-West Africa and Portuguese West Africa on the west. The territory may be divided into Southern and Northern Rhodesia, separated by the Zambezi, in the east and north, both under the charge of the British South Africa Company; and the Bechuanaland Protectorate in the south-west. Northern Rhodesia has been referred to under British Central Africa.

SOUTHERN RHODESIA

Position and Boundaries.—Southern Rhodesia lies immediately to the north of the Transvaal Colony, from which it is separated by the Limpopo or Crocodile River, which forms its southern boundary. Northwards it extends to the Zambezi. Its eastern boundary with Portuguese East Africa was defined by the Anglo-Portuguese Agreement of June 11, 1891, as the edge of the Manika plateau. To the west it is bounded by a line running south and east from the junction of the Chobi with the Zambezi, to the headwaters of the Shashi, and thence along the course of that river to the Limpopo; practically the old line of demarcation between the territories of Khama and Lo Bengula. It lies entirely within the tropics, extending in latitude from 22° S. to 16° S. and in longitude from 26° E. to 33° E.

[1] Includes Zululand.

Surface.—Through this territory there runs an elevated region which extends from the source of the Shashi on the west, north-eastwards to the source of the Hanyani or Manyami River, and thence trends south-eastwards to the sources of the Odyi and Pungwe. Along this elevated backbone runs the watershed between the Zambezi and Limpopo drainage areas, in the western and central portions of the territory, and between the Zambezi and Sabi further east. The whole country along the watershed exceeds 4,000 feet above sea-level, rising gradually from about 4,000 feet at the source of the Shashi in the west towards the north-east, where it reaches 5,400 feet at the source of the Hanyani River. In the Inyanga plateau, where the Ruenya, Odyi, and Pungwe rivers take their rise, it culminates in an altitude of over 7,000 feet, and sinks abruptly to the east. The surface of the elevated belt consists of open undulating grassy downs. To the north and west they slope gradually towards the Zambezi and the northern Kalahari desert, little or no broken country being met with near the watershed, but the open grass-land gradually gives place to continuous forest on the lower slopes. On all other sides the high plateaux are bounded by a belt of broken country which varies in breadth from 20 to 50 miles. In the south-west (Matabeleland) this belt may be described as hilly, and there is a fall of some 700 or 800 feet in a distance of from 20 to 30 miles; but in the east (Mashunaland) the descent to the low plains which border the east coast, and extend up the valley of the Zambezi, becomes abrupt and of a mountainous appearance. From the Inyanga plateau to the lower valley of the Pungwe there is a fall of over 5,000 feet in less than 100 miles.

Hydrography.—The highest portions of the plateau are granite, but on the slopes to the north, north-west, south, and south-west, ranges of hills of different formation run through the granite, and amongst them numerous gold-bearing quartz-reefs occur. On the value of these reefs the speedy development of the country must largely depend. The whole of the high plateau is well watered, the more easterly portions being intersected in every direction by innumerable small streams, which are fed from springs welling out from the head of almost every valley on the open downs. Most of these never run dry even in the driest seasons, being probably supplied from underground reservoirs in the granite, in which great quantities of water are yearly stored during the rains. Anomalous as it may seem, the highest portions of the plateaux of Southern Rhodesia are thus the best watered, though they are not dominated by mountain ranges. The innumerable small streams of the highest part of the downs gradually collect into brooks, and these converge to the main rivers which drain the country, and finally reach the Zambezi, the Limpopo or the Sabi. Following the watershed across the open downs which lie between the sources of the Hanyani and the Umniati rivers, where the altitude is between 5,000 and 6,000 feet, a little stream of running water will be met with at nearly every mile. But crossing from the Hanyani to the Umniati, some 2,000

feet lower down the slope, all these are found to be collected into a few small rivers, and stretches of country occur perhaps 20 miles wide without a single stream. Down still farther in the Zambezi valley not a single stream of water flows into the river between the mouth of the Hanyani and that of the Umniati (there called the Sanyati), a distance of perhaps 150 miles, the intervening country being entirely waterless during the dry season.

The Zambezi, which divides Southern Rhodesia from British Central Africa, is one of the largest rivers in Africa. It is navigable by steamers of light draught from its mouth for 300 miles to the Kuroa Basa rapids above Tete ; whilst a steamer placed on the river above those rapids might reach the mouth of the Gwai, 600 miles farther, if it could make its way against the strong current which rushes through the narrow defile of Kariba. From the mouth of the Gwai onwards a succession of rapids and two large waterfalls make the Zambezi unnavigable for any long distance without a break. The fall known as *Mosi-a-tunya* (smoke-sounding) by the natives, which was discovered by Dr. Livingstone in 1851, and named by him the Victoria Falls, is second to none in the world in magnificence, for although I will not say that it is finer than Niagara, it yet surpasses that stupendous cataract in some respects, and as a whole appeals quite as powerfully to the imagination. The magnitude of these falls will be understood from the bald statement that they are 2,000 yards in width and 450 feet in perpendicular height. The vast volume of water falls, not into an open gorge like Niagara, but into a narrow rift, whence the escape is by a still narrower zigzag ravine through a mass of hard rock. The falls are about 225 miles distant from Bulawayo, in a direct line, and the railway which crosses the river just below the falls was opened in 1905. The falls of Gonye on the Upper Zambezi, though not to be compared to the Victoria Falls, are yet very beautiful. They are also in British territory, being situated on that section of the Zambezi which flows through Northern Rhodesia, the central division of British Central Africa.

FIG. 474.—*The Victoria Falls on the Zambezi.*

Climate and Resources.—The climatic conditions of a territory which includes the low-lying valleys of the Zambezi and the Limpopo, as well as the high open plateaux of Matabeleland and Mashunaland, are naturally very diverse. In the low parts of the country the heat is often very oppressive ; malarial fever of a severe type is prevalent at certain

times of the year, and such districts are not suited for European colonisation. But the climate of the high plateaux, above the fever limit, is very fine and bracing, and the whole of Southern Rhodesia which lies above 4,000 feet seems destined soon to be settled by Europeans, whilst the area may possibly be extended in the couse of time to a somewhat lower level, as the cultivation and drainage of the land proceed. On the high plateaux the heat even in the hottest weather is not excessive, the shade temperature seldom exceeding 90° in the higher parts of eastern Mashunaland; in western Matabeleland, where the heat is greater, 100° F. in the shade is very exceptional, and at an altitude of 5,000 feet these temperatures are not very trying. On the plateau the nights are cool the whole year round; during the winter months of May, June, July and August, they even become cold and frosty. At that season the days are always bright and clear, pleasantly warm but not too hot. During the months of November, December, January, February and March, heavy rains may be expected, with thunderstorms during October and April, and occasionally a little light rain during the winter months. The season of continuous rain sometimes sets in early in November, at other times not until late in December, and as a rule the heaviest rains take place after Christmas. The rainfall is heavier in the east than in the west. The average is probably about 40 inches in the former district and 25 in the latter; but observations are not yet sufficiently numerous to enable one to speak definitely. In the rainy season which ended in April, 1891, a rainfall of 53 inches was recorded in Salisbury, Mashunaland, but the following year the rainfall was under 25 inches.

Agricultural Prospects.—It is clear that the most valuable portions of Rhodesia, those best fitted for agriculture and pasturage, are the districts lying on the broad back of the plateau along which the watershed runs. With few exceptions the lower one descends towards the valleys of the Zambezi and the Limpopo, the drier and more desolate the country becomes. For stock farming no portion of South Africa is better suited than the high plateaux of Rhodesia, in evidence of which when the forces of the British South Africa Company entered Matabeleland in 1893, there were over 200,000 head of horned cattle in that territory alone. Further eastward, too, cattle do equally well. A small flock of merino sheep was introduced into the country a few years ago and has thriven well, and it is quite possible that in the not distant future sheep farming may become as profitable as in any other part of South Africa. All European vegetables and many kinds of fruit do well; in fact, if a supply of water is assured either as rain or by irrigation during the dry season, almost everything required by civilised man can be grown. Excellent crops of wheat and oats may be raised all over Rhodesia during the dry season by irrigation, but if sown during the rainy season they are liable to suffer from rust.

Big Game.—Elephants, once very plentiful throughout the greater portion of Rhodesia, had become so much reduced in numbers by constant

hunting and the indiscriminate slaughter of females and calves as well as males, by hordes of natives armed with good guns and rifles, and a few Boer and British hunters, that the export of ivory from Matabeleland in anything but very small quantities had practically ceased before the country was taken possession of by the white men, in 1893. There are still, however, a good many elephants wandering about over the vast uninhabited tracts of country lying between the high plateaux of Matabeleland and Mashunaland and the Zambezi. As the natives of the country have now been disarmed, or if possessed of firearms, have no means of obtaining ammunition, and as the elephants are now so scattered and so wild that it would not pay a European to hunt them, and as, moreover, it is now a penal offence to shoot one, it may be hoped that these fine animals will again gradually increase in numbers in those districts of Rhodesia which are unfitted for European settlement.

All other classes of game, especially giraffes and many species of antelopes, which have been spared by the recent visitation of rinderpest, are too, owing to the fact that the natives have been disarmed, and in spite of the increase of the European population, undoubtedly on the increase. Buffaloes, elands and koodoos have suffered so seriously from rinderpest that it is possible that they may become extinct. Lions are still numerous, and commit serious depredations upon the settlers' live stock. They are therefore destroyed whenever it is possible to do so.

History.—But little is known of the ancient history of Southern Rhodesia. Rock paintings of a character identical with those found in the mountain caves of Cape Colony and the Orange Free State seem to show that the country was once inhabited by Bushmen. This pygmy race must, however, have been destroyed, or driven into the western deserts at a very remote period. Remarkable ruins of stone-built fortifications and temples, curiously carved and containing evidence that the builders worked in gold, are scattered over the plateau. They point to the early possession of the country by a civilised people, possibly the Sabæans from Arabia, and some believe that Southern Rhodesia contained the Ophir of Solomon. The Bantu races spread over the whole land, and, though divided into several sections, all the various clans spoke dialects of one language. Early in the nineteenth century Rhodesia was invaded by two Zulu tribes, the Abazwang indaba and the Abagaza, who, after devastating large areas of country, fought with one another, and the Abazwang indaba being defeated crossed the Zambezi and now live on the plateau to the west of Lake Nyasa under the name of Angoni, while the Abagaza settled in the highlands near the Sabi river. In 1837 another Zulu clan, under the chief Umziligazi, left the Transvaal and settled in the west of Rhodesia, now known as Matabeleland. For over fifty years they preyed upon the surrounding peoples generically known as Mashunas, and depopulated enormous areas of country. In 1890 the Rhodes pioneer expedition occupied the east of the country, which had suffered greatly from the Matabele.

Towns and Railways.—The township of *Salisbury* was established in 1890, and subsequently townships were laid out at *Victoria*, *Umtali* and *Melsetter*. Salisbury is most easily reached from the east coast by railway through the excellent seaport of Beira in Portuguese territory. As a result of the war of 1893 Matabeleland was definitely added to the territory of the British South Africa Company. Early in 1894 the European township of *Bulawayo* was established, some three miles distant from the old native kraal, near the top of the plateau close to the watershed. This town, which has already become an important place, has been connected with Cape Town (a distance of 1,600 miles) and with Salisbury. Lines have also been constructed from Bulawayo to the Victoria Falls *viâ* the Wankie coal-fields and to the Gwanda gold-fields; and from Gwelo (one of the most important of the more recent townships) to the Selukwe district; while another will shortly be made from Salisbury to the Mazoe district in the north-east.

THE BECHUANALAND PROTECTORATE

Position and Surface.—North of British Bechuanaland, which is now under the government of Cape Colony, lies the Bechuanaland Protectorate, containing the territories of several native chiefs, of whom the most important are, Batheon, Sebele (the son of Sechele), Linschwe and Khama. The southern portion of the Protectorate lies to the north of Bechuanaland proper, and extends west of the Transvaal for an indefinite distance into the Kalahari desert. In this part of the territory the natives live in large villages, most of which are situated on the headwaters of the Notwani and its tributaries flowing to the Limpopo. Before the terrible plague of rinderpest passed through the country in 1896 these people possessed large herds of cattle which, though spread over the country during the rainy season, were all collected along the rivers, round wells, or wherever there was permanent water, during the long dry season. The great waterless wastes of the Kalahari desert which lie to the west of the settlements are used as hunting grounds and are only permanently inhabited by a few scattered families of a people of Bantu origin, known as Bakalahari (*i.e.*, they of the desert), who live near the few permanent wells, and collect skins and ostrich feathers for their Bechuana masters.

The Bechuanaland Protectorate lies mainly on the western slope of the high plateaux of South Africa, and almost the whole of it has an altitude of about 3,500 feet. It is for the most part dry and arid, but good crops of maize, native corn (*Holcus sorghum*) and pumpkins are grown during the rainy seasons by the Bechuanas. Cattle, sheep and goats thrive well all over the country wherever there is water, as the pasturage is everywhere plentiful, and, except along the courses of the rivers, where fever is rife during the rainy season, the country is healthy for Europeans.

Khama's Country.—By far the largest portion of the Protectorate is ruled over by the well-known and enlightened chief Khama, whose lands

extend from latitude 23° 30′ S. in the south, where they march with Sebele's country, to the junction of the Chobi with the Zambezi in latitude 17° 50′ S. On the east they are bounded by the Transvaal and Southern Rhodesia, whilst to the west they extend in the southern portion for an indefinite distance into the Kalahari desert, and further north are divided by an undefined line from the country of Moremi, a chief whose principal settlement is on the Okovango River to the north of the desolate Lake Ngami. Both Khama and Moremi claim jurisdiction over the country lying along the southern bank of the Chobi to the east of Linyanti; although this strip of country has been assigned to Germany—by an Anglo-German convention without reference to either chief. Almost the whole of Khama's country is very sparsely peopled or entirely without permanent inhabitants; the vast majority of his tribe live together in the town of *Palapye*, the largest native town in South Africa, and the remainder are occupied in tending the great herds of cattle which graze along the banks of the Limpopo and other rivers. Before the visitation of rinderpest Khama and his people were very rich in cattle and also possessed large herds of fat-tailed sheep, and goats of a fine, large breed.

North-Western District.—The great desert wastes lying between the Botletlie River and Southern Rhodesia, and extending to the Chobi in the north, are uninhabited save by a few families of half-starved Masarwa Bushmen, wandering savages, who build no huts, do not till the ground, nor keep any kind of domestic animals save jackal-like dogs, but live on roots and honey, frogs and tortoises, with an occasional feast when they succeed in killing a large animal in a pitfall or with a poisoned arrow. The Bechuana tribes inhabiting the Protectorate are a branch of the great Bantu family who people South Africa, to the east of the Kalahari desert. South of the Zambezi the Bantu race may be divided linguistically into three branches, viz., that formed by the tribes speaking Zulu and cognate dialects, those which speak Chiswina or dialects of that language, and those which speak Sechuana or Sasuto. All these languages and dialects have been derived from one parent language probably at no very distant period in the past, as they are still all nearly allied.

A strip of country along the Transvaal frontier is reserved to the British South African Company, and along it the railway to Bulawayo which now runs beyond the Zambezi is carried.

STATISTICS (*estimates*).

	Area square miles.	Population.
Southern Rhodesia	141,000 ..	450,000
Bechuanaland Protectorate	213,000 ..	200,000

STANDARD BOOKS.

F. C. Selous. "Travel and Adventure in South-East Africa." London, 1893.
———— "Sunshine and Storm in Rhodesia." London, 1896.
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S. Passarge. "Die Kalahari." Berlin, 1904.

IV.—THE ORANGE RIVER COLONY

By the Right Hon. James Bryce, O.M., F.R.S.

Position and Surface.—The Orange River Colony is part of the great plateau of South Africa, and is not marked off by any natural boundaries of the first rank from the territories which border it on the north, west, and south. On the north and north-west it is divided from the Transvaal by the Vaal River, a stream of small volume except after rains, and from Cape Colony on the south by the Orange, but the physical character of the country on both sides of these rivers is similar. The surface is mostly level or gently undulating, with some ridges of hills and many isolated and frequently flat-topped eminences (*kopjes*), often bold in outline, but seldom rising more than 500 to 700 feet above the surrounding country. The whole plateau, however, has an elevation of from 4,000 to 5,000 feet above the sea. The scenery, though in some places pleasing, cannot be called fine except along the river Caledon, where the views of the lofty Maluti Mountains in Basutoland are often very striking. During and immediately after the rains of early summer (November and December) the wide plains, dressed in fresh verdure, have an expansive beauty of their own under the brilliant air, but for the rest of the year they are arid and monotonous, and the landscape is somewhat dreary. The only considerable rivers are the Vaal on the north-east, the Caledon on the south-east, and the Orange, which forms the south-west boundary and carries the water of the other two to the Atlantic. They are not navigable.

Climate, Flora and Fauna.—The climate is the normal one of the plateau, practically rainless during eight months of the year, with frequent heavy showers during the summer months of November, December, January and February, but a low annual rainfall. No part of South Africa is more healthy and bracing. Although snow seldom falls and soon disappears when it has fallen, the winter cold is severe in the higher and more exposed spots. In no part of South Africa is the want of wood more felt; there are no forests, and few trees are found except thorny acacias on the open plains and willows along the watercourses. The wild animals, which were once very common, have now become comparatively rare; but large herds of the beautiful springbok are still met with.

Resources.—The mineral resources of the Colony, so far as they have been explored, are much inferior to those of the Transvaal. Very little gold has been found, but there is one important diamond mine at Jagersfontein, in the western part of the Colony near the Vaal River. Coal is found in the Kronstad and Heilbron districts in the north, but the coal deposits have not yet proved to be large in extent nor of high quality. Tillage is at present practically confined to the strip of fertile land which lies along the right bank of the Caledon between Ficksburg and Wepener. This is one of the best agricultural districts in South

Africa, producing heavy crops of cereals without irrigation, for the rainfall there is comparatively good, as the mountains of Basutoland are not far distant. Other places might be cultivated if a larger neighbouring market encouraged the construction of irrigation works, and if capital were available for the purpose. The main reliance of the inhabitants is in cattle-breeding, and farms are large, for the pasture, though thin in the hilly districts, is good, and (save in exceptionally dry seasons) water can be found almost everywhere. Since the great outbreak of cattle plague in 1895 and the war of 1899–1902 the number of cattle has been greatly reduced. There are no manufactures.

History.—When the country which is now the Orange River Colony was first explored (1800–1830) by hunters, and afterwards by missionaries and wandering traders from Cape Colony, much of it was uninhabited, and large parts were in the hands of nomad Bushmen. There were considerable tribes of Kafirs of the great Bantu family, some of which had fled thither to escape the attacks of the Zulus, while some few Griquas, a mixed race of Dutch and Hottentot blood who lived chiefly by hunting, had moved eastward from Cape Colony and dwelt in the extreme west near the Orange river. About 1830 the cattle farmers in the outer part of the Colony began to drive their herds at certain seasons across the Orange river for change of pasture, and in 1836 the "Great Trek," an emigration *en masse* of some thousands of Dutch farmers from the Colony, brought a considerable white population for the first time into these regions. These emigrants desired to escape from the sovereignty of the British Crown, and were for some years permitted to live in practical independence. They did not, however, either eject the Kafir tribes or maintain any regular government among themselves ; and their frequent quarrels with the natives, inducing trouble on the borders of the Colony, ultimately induced the British Government, which had always continued to claim their allegiance, to move forward. In 1846 a British fort was erected and a garrison placed at Bloemfontein, and in 1848 the territory between the Orange and Vaal rivers was annexed under the name of the Orange River Sovereignty. The Dutch settlers, aided by those who had settled north-east of the Vaal, rose in arms and were defeated by Governor Sir Harry Smith, but troubles presently broke out with the Basuto Kafirs living to the south of the Sovereignty, and in 1854 the British Government (which had two years previously renounced its authority over the emigrant Boers who lived beyond the Vaal) withdrew from the Sovereignty, considering that it involved more expenditure and trouble than it was worth. The Sovereignty was recognised as independent, under the name Orange Free State, on undertaking never to permit slavery or the slave trade. In 1899 war broke out between the Free State (allied with the Transvaal) and the United Kingdom, and, although Bloemfontein was occupied by the British army early in 1900, was prolonged for two years more, the supremacy of the British Crown being finally recognised by the peace of May 31, 1902.

During the existence of the Orange Free State the government was vested in a popular assembly called the Volksraad, and in a President assisted by an Executive Council. This system worked smoothly, and the history of the Free State from 1854 to 1899 was, on the whole, free from trouble or excitement. The most important events were the successive wars with the Basuto Kafirs, in one of which the fertile territory along the north bank of the Caledon river was conquered from that tribe, and the dispute with the British Government over the district in which the town of Kimberley now stands, where diamonds were discovered in 1869. Although sympathising with their kinsfolk in the Transvaal Republic, the people of the Orange Free State never assisted them against the British power until the war of 1899–1902. Before the war, about four-fifths of the white population were of Dutch origin, and the Dutch language—or rather a South African dialect of it—was generally spoken, except in *Bloemfontein*, the capital, and the only place large enough to deserve the name of a town, where nearly everybody knew something of both Dutch and English. In 1890 there were about 130,000 natives, some living in a tribal state and cultivating the land or keeping cattle, but the majority in the employment of the whites. Nearly all the whites and a great part of the Kafirs belonged to the Dutch Reformed Church, which received a grant from the public treasury. One line of railway, forming part of the trunk line which runs from Cape Town to Johannesburg and Pretoria, passes through the colony from end to end, and several branches have been constructed, while others are either under construction or contemplated, including one to join the main line with the Natal system *viâ* Harrismith. The colony was granted responsible government in 1907 with a constitution similar to that of the Transvaal.

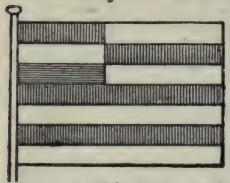

FIG. 475.—*The Flag of the former Orange Free State.*

FIG. 476.—*Average population of a square mile of the Orange River Colony.*

STATISTICS.

	1880.	1890.
Area of Orange Free State, square miles (estimate)	48,326	48,326
Population	133,518	207,503
White Population	61,022	77,716
Density of population per square mile	3	4
Population of Bloemfontein	2,567	3,459

ANNUAL TRADE (*in pounds sterling*) 1891–95.

Imports	1,000,000
Exports	1,500,000

V.—THE TRANSVAAL COLONY

By the Right Hon. James Bryce, O.M., F.R.S.

Position and Surface.—The Transvaal Colony, formerly the South African Republic, and now (since 1894) including the dependent native territory of Swaziland, is bounded on the east by Portuguese East Africa and the British territories of Tongaland and Zululand, on the south by Natal and the Orange River Colony, on the west by Cape Colony and the British Bechuanaland Protectorate, on the north by territories of the British South Africa Company. About one-sixth of its area lies within the tropics. Physically it consists of two regions. The larger part belongs to the great South African plateau, and has an average altitude of from 4,000 to 5,500 feet, some valleys sinking to 3,000, and a few eminences rising to 6,000 feet. Like the rest of that great plateau, this part is bare and arid, covered with thin grass, and here and there with a still scantier growth of thorny trees and shrubs. It goes by the name of the High or Grass Veldt. About one-third of the area, forming the northern portions of the country and a long but comparatively narrow strip along the eastern border are much lower, from 1,000 to 3,000 feet above sea-level, and much hotter; they are in most places well wooded, and are called the Bush Veldt. The most considerable range of mountains runs nearly north and south, forming the eastern edge of the great plateau to which the High Veldt belongs. This range is a part of the great chain which bears the name of Drakensberg or Quathlamba, and some of its summits reach 7,000 feet. The smaller range of the Magaliesberg runs westward from Pretoria, dividing the basin of the Vaal river from that of the Limpopo. The only large rivers are the Vaal, which forms the southern boundary of the Transvaal, the Olifants (Elephant's) river, and the Limpopo, which rises near Pretoria, flows first north-westward to the Bechuanaland frontier, then turns north and east, and forms for a long distance the northern boundary. None of these is navigable.

Climate.—The physical aspects, climate, fauna and flora of the High Veldt region are those typical of the South African Plateau. The rainfall is largest on the eastern mountain range, exceeding there 30 inches in the year, while on the western plains it is perhaps only 15 inches. As all the rain falls during the summer months, and nearly all of it in December, January, and February, the surface is very dry and parched during the rest of the year. The summer heat is intense, although tempered by strong south-easterly breezes; while the winter cold is severe only in a few of the highest districts, such as the ridge of the Witwatersrand. There is, however, little frost and practically no snow, because of the dryness of the cold weather. The High Veldt is as a rule healthy, owing to its dryness; but malarial fevers occur in the lower grounds on the banks of streams. On the other hand the Bush Veldt region, being comparatively low and

in many places marshy, covered with long grass and often with thick wood, is very feverish, particularly in the Limpopo valley and along the Portuguese frontier. In these woody regions the largest number of wild animals remain. The elephant and rhinoceros, together with the buffalo and many of the large antelopes, may still be killed in the north-eastern districts; the lion, though growing rarer, is not yet extinct, and the leopard is still abundant. All the larger and some even of the smaller rivers are full of crocodiles, and the hippopotamus is found in the Limpopo.

Agricultural Resources.—Many parts of the lower grounds are well suited for tillage, having a rich soil and a sufficient rainfall, but owing to the sparseness of the population and the prevalence of fever, only a trifling area is as yet under the plough. Cotton and sugar might be raised, as well as maize, which is at present practically the only crop. Artificial irrigation is necessary in most parts of the dry High Veldt, where the tillage as yet is mostly of the market-gardening kind along the streams. Excellent tobacco is raised, which might be made an important article of export. All the surface, except those lower parts of the Bush Veldt which are infested by the tsetse-fly, and some parts of the High Veldt where the soil is exceptionally poor and stony, is fit for live stock; and the keeping of cattle or sheep was, until the discovery of gold, practically the only occupation of the people. The grass is in most places so thin that the pastoral farms are very large, and it is the custom of the farmers to drive their herds in winter to the lower grounds of the Bush Veldt, and in summer to the High Veldt, where good fresh grass springs up after the rains of November and December. The cattle were enormously reduced in number by the plague which appeared in 1896; but the country is capable of supporting a much larger number than it has ever yet had.

Mineral Resources.—In minerals the Transvaal is, so far as we yet know, far richer than any other part of South Africa. It has large deposits of coal, though not of the best quality; the output for 1897 was returned at 1,667,000 tons. Associated with the coal there are extensive beds containing iron. Copper, silver and lead have also been found, but are little worked. There are three districts in which diamond-mines are worked, though on a comparatively small scale. The gold which has made the country famous occurs in three forms, viz., alluvial deposits, quartz reefs, and beds of conglomerate rock. The alluvial deposits occur in the valleys of the eastern mountain range, and do not seem to be important. The quartz reefs also occur chiefly in these mountains on the edge of the plateau. Some of them have been worked for more than twenty years, and many exist which have not yet been fully explored. They would receive more attention but for the superior attraction of the conglomerate beds where the gold is found, not in "pay-shoots" here and there along the line of a quartz reef, but uniformly diffused through the sandy and clayey matter of the beds. The conglomerate is called "banket," the Dutch name for almond toffee, on account of its appearance, fragments of quartz being imbedded in the arenaceous

matter. These auriferous beds occur along the edge of a geological basin about 46 miles long and 15 broad in the southern part of the republic. The northern rim of this basin is formed by the long rocky ridge called the Witwatersrand, and the gold-field, first discovered in 1884, is hence known as The Rand. Before the war it produced about £16,000,000 worth of gold annually, and the Transvaal ranked as the first gold-supplying country of the world. The large mass of rock which is known to contain gold, and the generally uniform diffusion of the metal through it, gives gold-mining on the Rand a certainty found nowhere else, and make it worth while to expend large sums on sinking shafts and establishing costly machinery. The drawbacks are the difficulty of securing sufficient labour, as the hard work must be done by Kafirs, who dislike underground toil, and are moreover uncertain labourers (especially prone to drink), and the heavy cost of machinery and of food.

FIG. 477.—*The Rand.*

People.—The Transvaal as a whole is very thinly peopled, and many parts of it, especially in the north-east, have no fixed white inhabitants, the cattle farmers being really nomadic in their habits. On the other hand, the Witwatersrand mining district has in Johannesburg the largest town in South Africa, and is studded with smaller towns. More than half of the white population live on or near the Rand. Of the whites in 1899 probably one third, or 75,000, were descendants of the Dutch emigrants from Cape Colony, most of them speaking only the South African dialect of Dutch. These figures have, of course, changed since the late war, both absolutely and relatively. The remainder, numbering probably 150,000 (though no exact figures are obtainable), had been drawn to the country by the gold-mines, and include English or Dutch speaking colonists from the Cape and Natal, natives of Great Britain, of Australia, of North America, and of Germany, with a few Frenchmen and Italians, as well as Russians. A great many are Jews. The great majority of the new-comers speak English, and they form the trading and artisan part of the population, as well as the skilled miners. The natives are either (1) tribal Kafirs living under their own chiefs in Swaziland and in the northern and eastern districts, (2) domesticated servants of white masters, or (3) comparatively wild Kafirs who have come to the mines to work for a few weeks or months only, and then return with their wages to their remote homes.

FIG. 478.—*Average population of a square mile of the Transvaal.*

History.—The history of the Transvaal Colony, although short,

has been chequered and troublous. In 1836 a large number of Boers (*i.e.*, farmers of Dutch extraction), left Cape Colony in disgust at the wrongs which they held themselves to have suffered at the hands of the British Government. Many of them settled to the north-east of the Vaal river, and, defeating the natives who attacked them, formed several small self-governing communities which ultimately coalesced into one republic. The British Government continued to claim the Boers as its subjects till 1852, when, by the Sand River Convention, it recognised the South African Republic as independent. During the twenty years that followed, the communities were involved in serious trouble with the natives. The condition of the Republic became so serious that the British Government feared that its colonies might also be involved in native wars, the inquiries it made led it to believe that annexation would not be unwelcome to the people, as this would ensure their protection against the Kafirs and improve their material interests. Accordingly the country was annexed in April, 1877. The Boers were, however, more strongly attached to their independence than the British had supposed, and some grave mistakes made by the government increased the spirit of resistance. In the end of 1880 it broke out in insurrection, the few British troops were compelled to surrender or were cooped up in the forts; and the Boers who marched to the Natal frontier inflicted three defeats on the small British army which was preparing to recover the country. Convinced that the annexation had been a mistake, made in ignorance of the sentiments of the people, and fearing that a general war of races might break out in South Africa if the conflict were prolonged, the British Government recalled the large force which it had sent out, and which could easily have crushed all resistance, and in 1881 concluded a convention whereby the autonomy of the Transvaal was recognised subject to the suzerainty of the British Crown and to certain conditions, which were modified by the Convention of London in 1884. The Republic enlarged its boundaries by acquiring (in 1888) one of the best regions of Zululand, and in 1894 it was allowed to annex Swaziland, the territory of a small native tribe lying on its eastern border. In 1885 the wealth of the *banket* (conglomerate) gold-bearing beds of the Witwatersrand became generally known, and the immigration of foreign miners suddenly and immensely swelled. By 1895 there were probably about 100,000 of these new-comers, and they outnumbered the whole of the Boer population. Being excluded from political rights, they set on foot an agitation to obtain a share of power, and in December, 1895, a body of mounted police in the service of the British South Africa Company entered the Republic in order to support the agitation. The invading force was, however, defeated and obliged to surrender.

In October, 1899, war broke out between the South African Republic and the United Kingdom. Johannesburg and Pretoria were occupied by the British troops in June, 1900, but the Boers protracted the struggle

until May 31, 1902, when a treaty of peace was signed, by which the country came under the British Crown. The colony was granted responsible government in 1906, and is administered by an elected house of representatives and an upper house nominated by the Governor. The Boers belong to the Dutch Reformed Church, but all sects have been tolerated, although Roman Catholics and Jews were until recently subject to political disabilities. Education has hitherto been in a backward state, especially among the pastoral and semi-nomadic population; and there are no manufactures, nor, indeed, any handicrafts except those connected with mining.

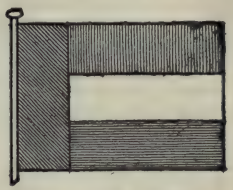

FIG. 479.—*The former Transvaal Flag.*

The railways in the Transvaal belonged, before the war, to a corporation called the Netherlands Railway Company, but have now been taken over by the Government, and are known as the "Central South African Railways." They radiate from Pretoria and Johannesburg to the coast at Delagoa Bay on the east, to Cape Town through the Orange River Colony in the south, and to Durban through Natal in the south-east. There are also one or two branch lines, and a trunk line to the north has been carried as far as Pietersburg. *Pretoria* is the seat of the legislature, public offices, and law courts, but *Johannesburg*, the centre of the Rand gold-field, is by far the largest and wealthiest town. English is now spoken by the majority of the inhabitants, but Dutch is still the language generally spoken by the rural population. The vast majority of the native Kafirs are heathen and speak only their own languages; a few, however, understand Dutch.

STATISTICS. (*Estimates.*)

	1890.	1898.
Area of the Transvaal (including Swaziland), square miles	113,642	119,139
Population „	479,128	867,897
White Population „	119,128	245,397
Density of population per sq. mile	4	7
Population of Johannesburg	40,215	102,078
„ Pretoria (white)	5,000	10,000

ANNUAL TRADE (*in pounds sterling*).

	1881–85.	1891–95.	1896.
Imports	700,000	5,726,000	14,000,000
Exports (including gold)	500,000	5,000,000	—

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W. L. Distant. "A Naturalist in the Transvaal." London, 1892.
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VI.—GERMAN SOUTH-WEST AFRICA

By Graf von Pfeil.

Position and Surface.—The coast of German South-West Africa, about 800 miles long, possesses no important harbours. Angra Pequena and Walfish Bay are gradually being filled with sand by the north-running coast current. Swakopmünde is likely to become useful with artificial aid. South-West Africa may be termed the western part of the Kalahari plateau, which rises gradually and reaches its highest elevation in a region indicated by a line drawn from Mount Omatoko to the Awas Mountains, with an altitude of 8,500 and 6,900 feet respectively. The west end of the plateau is precipitous, forming a mountain range with meridianal direction, and approaches in Namaland nearer to the coast than in the northern part of the country. West of Windhoek the Mountains develop into ranges with more independent character. From its central and most elevated part the plateau slopes to the north and south as indicated by its river system. The Nosob, Awob and Fish rivers rise in the central mountainous district, and run south and east. Hereroland sends the Uomatako in a north-east direction to the Okovango. The precipitous western border of the Kalahari and also the adjacent district called the Kaoko, send their scanty waters through a number of rivers to the Atlantic; but only the Swakop and Kuiseb are important. The Cunene, which for some distance forms the northern boundary of the protectorate, does not belong to its river system; the Orange River, which forms the entire southern boundary, only belongs to it in so far as it is the recipient of all the rivers with a southerly course. With the exception of these two streams and the Okovango no South-West African river is perennial. After heavy rains they fill suddenly, and run for a short time; but water can as a rule only be obtained by digging in the sand which fills their beds. The so-called pans, Etosa and others, are remarkable remnants of a lacustrine formation. Parallel with the coast runs a sandy desert belt, about 35 miles broad in the south, and narrowing to a point in the north. East of this belt a strip of mimosa bush extends to the foot of the mountains, which together with the Kalahari plateau form excellent grazing land. The porous calcareous sandstone which nearly everywhere composes the tableland, and covers the underlying gneiss and granite, retains a large portion of the yearly rains, and yields water readily when dug into. Numerous hot springs exist. The climate is nowhere malarious except in the neighbourhood of the

Okavango and Zambezi. In the mountainous districts ice occurs frequently.

People and Government.—Bushmen and Bergdamaras are presumably the primitive inhabitants. Bantu tribes, Hereros and Ovampos, immigrated from the north. The Hottentots came from south of the Orange River. The Bantu tribes differ in languages and customs, and live under influential chiefs. The Hottentots, with but one common tongue, are divided into many clans ruled by small but sometimes warlike chiefs. The Bergdamaras live in insignificant communities without chieftains. The Bastards, the progeny of Boers and Hottentots, are nearly all Christians, and form communities with tribal habits and rulers. The Bushmen roam in the Kalahari in yearly decreasing numbers. Vegetation is scanty; the littoral district produces simply mimosas, the desert north of Swakop the welwitschia, on the banks of the rivers occurs the arra tree, on the sandy dunes the nara. Rare specimens of elephant, rhinoceros, giraffe and buffalo still exist; antelopes are plentiful. South-West Africa was declared a German possession in August, 1884, after Lüderitz of Bremen had previously bought the land by private contract from native chiefs. For purposes of administration the protectorate is divided into three main districts, each the seat of a court of law, of an administrative officer and garrison for a number of colonial troops. *Windhoek*, the largest and most central settlement, is the residence of the military governor. A railway has been made to it from the coast at Swakopmund.

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VII.—ISLANDS OF THE SOUTH ATLANTIC

By Edward Heawood, M.A.

Ascension.—The island of Ascension, eight miles in length, rises in 8° S. from the longitudinal ridge which divides the South Atlantic into an eastern and western trough. It is entirely composed of extinct volcanic cones, and except on Green Mountain (2,820 feet) in the south-east, the surface is parched and barren, water being scarce, but the climate is very healthy. Land crabs roam all over the island, and turtles frequent the shores in large numbers in the breeding season. Ascension was discovered by the Portuguese in 1501, but was long unoccupied. It was garrisoned by Great Britain in 1815, and is entirely under naval rule, being, in fact, treated as a man-of-war. The anchorage is on the north-west coast, where is the small settlement of *Georgetown*. Landing is difficult on account of the rollers.

St. Helena.—The island of St. Helena, in 16° S., 800 miles south-east of Ascension, is an isolated volcanic cone rising from the depths of the

eastern Atlantic. It is bounded by precipitous cliffs, and is composed of rugged ridges and plateaux, the highest ground (2,700 feet) forming a semi-circle concave to the south. When first visited, the island was covered with a rich vegetation, but the introduction of goats, coupled with the destruction wrought by man, ruined the red-wood and ebony forests, and the soil has since been in great part washed away by rain, leaving the slopes barren. Willows, poplars, and other plants of the temperate zone, have been introduced, and the native flora remains only in the most inaccessible parts.

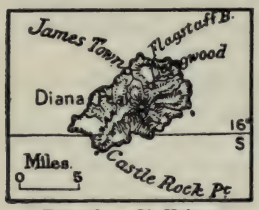

FIG. 480.—*St. Helena.*

St. Helena was discovered in 1502, and, lying in the track of ships carried homewards from the Cape by the trade winds, soon became an important place of call. Occupied by the East India Company in 1651, it became a Crown Colony in 1834, but its importance has greatly declined since the introduction of steam navigation and the opening of the Suez Canal. It is famous as the place of exile of the first Napoleon (1815–21). The settlement of *James Town* occupies the mouth of a narrow valley on the north-west or lee side of the island, debouching on James Bay. The natural resources of the island are not great; but the fisheries off the coast are capable of development.

FIG. 481.—*The Badge of St. Helena.*

Tristan da Cunha, with a few neighbouring islets, rises from the southern end of the same ridge as Ascension, in 37° S. It is bleak and inhospitable, being exposed to storm and rain for nine months in the year. Its highest summit—a rounded cone rising from a plateau ending in a cliff—is snow clad except in mid-summer. The one species of tree, *Phylica arborea*, stunted but fairly plentiful, is almost confined to the group. Tristan was occupied by Great Britain in 1816–17, and the present population (which has lately fallen to about fifty) consists of the descendants of a few of the garrison who remained, reinforced by settlers of various nationalities. They look to the British Government for protection, and are dependent on the occasional visits of men-of-war for communication with the rest of the world

STATISTICS (*approximate*).

Ascension (area in square miles)	58
Population of Ascension	200
St. Helena (area in square miles)	47
Population of St. Helena	4,000
Tristan da Cunha (area in square miles)	45
Population of Tristan da Cunha	50

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CHAPTER LIII.—ISLANDS OF THE WESTERN INDIAN OCEAN

I.—MADAGASCAR

By Rev. James Sibree,
Antananarivo.

Position and Exploration.—Madagascar is situated in the Indian Ocean, about 230 miles distant (at its nearest point) from the south-east coast of Africa, and is nearly twice as large as the United Kingdom. It extends from 12° to 25° S., and from 43° to 50½° E.; its length, from north to south, is 980 miles, the main axis of the island running north-north-east and south-south-west. Its broadest portion is near the centre, where it is 350 miles across; from this part of the island its northern half forms a long, irregular triangle, while south of it the average breadth is 250 miles. Although known to Arab merchants for more than a thousand years past, and frequently visited by Europeans since the beginning of the sixteenth century, Madagascar is still but imperfectly explored; since the year 1865, however, numerous journeys have been made in the interior, and every year sees some fresh portion of the country mapped more or less accurately. Conspicuous in this work have been missionaries, both Protestant and Roman Catholic; of the former the late Rev. Dr. Mullens, whose large map (1879) embodied all that was known up to that date; and of the latter, Père D. Roblet, S.J., whose fine map (1889) includes not only his own and other surveys, but also the discoveries of the distinguished French traveller and scientist, M. Alfred Grandidier, whose great work on the island, which is to include over fifty quarto volumes, was commenced in 1875 and is still (1903) in progress.

Configuration.—Madagascar has a very regular and compact form, with but few indentations, considering its great length of shore-line. More than half of the eastern coast runs in an almost perfectly straight line; but the north-west portion is broken up by a number of spacious inlets, some of them land-locked and of considerable area. The island consists of two great natural divisions, (1) an elevated interior region, raised from 3,000 to 5,000 feet above the sea; and (2) a comparatively level country surrounding the high land, and not much exceeding 600 feet in altitude, narrow on the east, but wide on the west and south; it is broken up towards the west by three prominent ranges of hills running north and south.

The elevated region is composed chiefly of gneiss and other crystalline rocks, with enormous quantities of red clay-like earth consisting of decomposed gneiss. It is a mountainous region, there being very little level ground, except the river valleys, and some extensive and fertile plains, occupying the beds of ancient lakes. The general face of the interior country consists of bare rolling moors, from which the unstratified rocks protrude and form the highest parts of the hills; these have mostly a rounded dome or boss-like outline, but in some districts present a very varied and picturesque appearance, resembling titanic castles, cathedrals, pyramids, and spires. This interior highland comprises about half the total area of the island, and is not exactly central, the watershed running down the eastern side of the island at no great distance from the coast. Ankaratra, probably an ancient volcano, with summits nearly 9,000 feet above sea-level, is the highest mountain of Madagascar.

The lower region is fertile and well-wooded, especially on the eastern side of the island, which is bathed by the constant rains brought by the south-east trade-winds. The western and north-western portions consist principally of Secondary strata, of the Jurassic and Cretaceous periods, with some Eocene and Quaternary beds. From the south-east to the north-west and north groups of extinct volcanic craters occur, as well as streams and sheets of lava. These old cones and vents are very numerous near Lake Itasy (19° S., 47° E.), in the Betafo district, about 50 miles further south, and to the north on the island of Nosibe, and adjacent coast. Hot springs are found in many parts of the island, and slight earthquake shocks are felt every year.

Hydrography.—Owing to the slope of the high land almost all the chief rivers of Madagascar flow to the west coast, crossing three-fourths of the breadth of the island. The Betsiboka, the Tsiribihina, the Mangoky, and the Onilahy are the largest and most important, and some of them can be ascended by vessels of light draught for a hundred miles or so, until rocky bars stop navigation. The eastern rivers, the largest of which is the Mangoro, cut their way through the ramparts of the high land by magnificent gorges amidst dense forests, descending by a succession of rapids and cataracts. The largest lake is the Alaotra, in the Antsihanaka province. A remarkable chain of lagoons extends for about 300 miles along the east coast, south of Tamatave, forming a natural waterway, which has been improved by the cutting of canals where necessary.

Climate.—The climate of the high interior districts is temperate and healthy, with no intense heat; but that of the coasts is much hotter, especially on the west; and from the large area of marsh and lagoon, malarial fever is prevalent and frequently fatal. The seasons are two, the hot and rainy season, from November to April, and the cool and dry season during the rest of the year. Rain, however, falls almost all the year round on the eastern coast, but is much less frequent on the western side. No snow is known, but hail showers and terrific thunderstorms are frequent in the hot

season, and hurricanes occur every few years. The average yearly rainfall at Antananarivo for 16 years was 53 inches; at Tamatave, 90 to 100 inches, at Mojanga, on the north-east coast, 50 inches; while average mean annual temperature at the same places was respectively 62°, 75°, and 79° F.

Flora and Fauna.—All round the island is a nearly unbroken belt of dense forest, varying from 10 to 15 miles across, but most largely developed in the north-east. The flora is therefore very rich and varied, and contains large numbers of trees producing valuable timber, as well as numerous species of palm, bamboo, tree-fern, pandanus, baobab, tamarind, and euphorbia. The flora is divided by Rev. R. Baron into three regions—eastern, central and western. Among the most characteristic forms of vegetation are the traveller's-tree, the Rofia palm, the Madagascar spice-tree, the Casuarina, and the Tangena; and also the curious lace-leaf plant, as well as numerous species of orchids and ferns. Many trees have large and showy flowers. Three-fourths of the species and one-sixth of the genera of the plants are endemic, showing that the island is of immense antiquity. About 4,000 indigenous species are known, and there is one natural order, Chlænaceæ, with 24 species, confined to the island.

The fauna contains several exceptional and ancient forms of life, comprising many species and even genera known nowhere else; but, considering its proximity to Africa, the country is markedly deficient in the larger carnivora and in ungulate animals. Madagascar is specially the home of the Lemuridæ, there being 38 known species of this and allied families of Quadrumana, and also the very curious aye-aye (*Cheiromys*). It is the chief habitat of the chameleons, about half of all the known species being found here. Of land-birds, 38 genera and 125 species are peculiar to the island, many of them being unlike any other living forms. The remains of many species of extinct struthious birds (Æpyornithidæ) are found in recent deposits, some of them being of gigantic size (over ten feet high), and laying the largest known egg (12¼ in. by 9¼ in.). Fossil remains of immense tortoises, saurians, and lemuroids have also been discovered.[1]

People.—The Malagasy people appear to be mainly derived from the Malayo-Polynesian stock, and they have also numerous points of connection with the Melanesian tribes, from which the darker element of the Malagasy is probably derived. There is also an admixture of African blood, especially in the western regions; and there is an Arab element both on the north-west and south-east coasts. The Hova, the most advanced, civilised and intelligent Malagasy tribe, inhabiting the central province of Imerina, and the dominant race for the last century, are probably the latest immigrants and the most purely Malayan in origin. Other important tribes are the Betsileo (southern central), Bara (further south-west), Tanala (south-eastern forests), Betsimisaraka (east

[1] A decree of the Governor-General in 1898 reserves to Frenchmen alone the right of collecting or searching for these fossils.

coast), Sihanaka (north-east central), and Sakalava (nearly the whole west coast). All the coast peoples, who are much subdivided, appear to be closely connected with each other in language; and, although there are many dialectal differences, the language of the whole country is substantially one, and is nearly allied to Malayan and Melanesian. The Malagasy not having had their language reduced to writing until the early part of the nineteenth century, have no ancient literature, but their numerous proverbs, songs, fables and folk-tales, and their oratorical gifts, as well as the copiousness of their language, prove their intellectual acuteness. In their heathen state they are immoral, untruthful and cruel in war; but they are also courageous, affectionate and firm in friendship, kind to their children and their aged and sick relatives, law-obeying and loyal, very courteous and polite, and most hospitable. While retaining some traditions of a Supreme Being, they practised, and in parts of the island still practise, a kind of fetishism, together with divination, curious ordeals and ancestor-worship.

History.—Madagascar was first mentioned under its present name by Marco Polo (1300), but the Portuguese navigator Diogo Diaz was, in 1500, the first European to see the island. Colonies were subsequently formed on the coast by the Portuguese, the Dutch, the English, and the French, but none of these were maintained for long; although the French held the islands of Ste. Marie and Nosibe, until the war of 1883–85 resulted in their obtaining the protectorate of the whole country, and the war of 1895 gained for them the sovereignty of Madagascar. The island is now a French colony, ruled by a Governor-general, with subordinate officers at all the principal towns and ports, and native officials acting under French authority.

Up to the middle of the seventeenth century Madagascar was divided into a number of independent chieftaincies. About that time, however, the Sakalava, a warlike tribe on the south-west coast, conquered the whole western side of the island, and founded two powerful kingdoms. Early in the nineteenth century the Hova, under Andrianampoinimerina (died 1810) and his son Radama I., threw off the Sakalava yoke and gradually made themselves masters of all the northern half of the island, and of much of the interior and the eastern seaboard. Radama abolished the export slave-trade and gave encouragement to English missionaries, who commenced work at his capital in 1820. They reduced the language to a written form, translated the Holy Scriptures, formed numerous schools, founded Christian churches, and introduced many of the arts of civilised life. The accession of Queen Ranavalona I. in 1828 stopped progress; a severe persecution of the native Christians ensued, until the accession of Radama II. in 1861 reopened Madagascar to Europeans. Thenceforward continuous progress has been made in commerce and civilisation. Under Queen Ranavalona II. (1868–83) Christianity was outwardly accepted by the peoples of the central

provinces. In 1895 there were 1,600 Protestant Christian congregations, with 280,000 adherents, but the Roman Catholic influence, then much smaller, has largely increased owing to the methods adopted by the Jesuit missions. Several colleges and high schools, as well as hospitals, dispensaries, leper asylums and orphanages, have been established; and the mission presses issue 250,000 copies annually of various publications.

Trade and Communication.—The things made in Madagascar are literally "manu"-factures, since all are made by hand. The Malagasy are skilful in the weaving of cloths or *lámba* for their own use, of silk, cotton, hemp and rofia fibre, from which cloths called *rabannas* are made and exported to Mauritius and Réunion. They also plait a great variety of strong and beautiful mats of different vegetable fibres; many thousand mat bags are sent to the Mascarene Islands for packing sugar, and fine straw hats are made, and are the usual head-covering of the Hova and other tribes. The principal exports of Madagascar are cattle, hides, gum-copal, india-rubber, bees-wax and rice, and, more recently, ebony and other valuable woods; coffee, tea, sugar and vanilla are also being cultivated by Europeans. The chief imports are cotton goods, iron-mongery, crockery, tinned provisions and rum. The principal trade is from the eastern ports to Mauritius and Réunion, and also with Europe, India, America and South Africa, but France takes a preponderating share. The whole foreign trade was estimated in 1901 at about £1,650,000, of which sum imports (mainly cottons) accounted for about £1,300,000. The soil of the coast plains, especially of the east side, is fertile, and could supply quantities of most tropical productions. Iron is abundant, especially as magnetite, and also as hæmatite and ironstone; and the Malagasy are skilful in the working of this and all other metals. Other mineral productions are copper, galena (lead), sulphur, and gold in considerable quantities. Until the French occupation there were no roads in the country, but these have now been constructed between the principal towns, while a railway has been made from Tamatave to the capital, and others are projected. Telegraph lines have also been opened. Away from the main routes the chief means of conveyance is a kind of light palanquin, carried by four bearers, and all merchandise and produce is carried on men's shoulders. The rivers are largely used by native canoes.

Towns.—The towns are few and of no great size, the largest being the capital, *Antananarivo* (French, *Tananarive*) originally a tribal chief village, then the Hova capital, and finally the chief town of Madagascar. It is built on the summit and slopes of a long, rocky ridge rising about 700 feet above the surrounding valleys. It doubtless owes its position to its situation on the edge of a magnificent and extensive rice-plain, watered by the river Ikopa and its tributaries, which also supports several hundred neighbouring villages. It contains many large and handsome buildings—

palaces, churches, public offices, colleges and schools, and private residences of brick and stone. The only other inland town of importance is *Fianarantsoa*, the capital of the Betsileo province, also near a fine rice-plain, and with many handsome buildings. The chief ports are *Diego-Suarez* in the extreme north, *Tamatave*, *Vatomandry*, *Mahanoro*, *Mananjara* and *Fort Dauphin* on the east coast, and *Majunga* in the north-west.

STATISTICS.

(These figures are estimates only.)

Area of Madagascar (square miles)	230,000
Population of Madagascar	4,000,000
„ „ Antananarivo	60,000
„ „ Tamatave	12,000
„ „ Fianarantsoa	10,000

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——— "Madagascar before the Conquest." London, 1896.

II.—SMALLER ISLANDS OF THE INDIAN OCEAN

BY THE EDITOR.[1]

Islands of Indian Ocean.—The British colony of Mauritius is an island in the western Indian Ocean, in 20° S., and about 500 miles east of Madagascar. Several distant groups and scattered islands are attached to it politically. The principal are the Seychelles, Rodriguez, the Amirantes and the Oil Islands, the latter including the Chagos Group, of which Diego Garcia is the most important. The islands of Mauritius and Réunion crown a small rise of the ocean floor everywhere surrounded by depths exceeding 2,000 fathoms, and Rodriguez and the Chagos archipelago are similarly isolated. The other islands, however, and some extensive banks are all based on the great sickle-shaped rise, the western arm of which is occupied by Madagascar, as shown in the sketch-map (Fig. 482). These islands are particularly interesting, from the biological point of view, on account of the singular character and distribution of some of their animals and plants.

Mauritius—Physical Features.—The coasts of Mauritius are generally low, with several deep openings, and fringed by coral reefs. There are, however, only two good harbours—Port Louis, in the north-west, and Grand Port, in the south-east; but the latter, being exposed to the south-east trade wind, is now little used. The central part of the island consists of a plateau, rising into three principal groups of mountains; that in the south-west containing the highest summit in the

[1] Assisted by E. J. Hastings.

island, Piton de la Rivière Noire, which reaches 2,700 feet. The Port Louis group, in the north-west, culminates in the remarkably shaped peak of Mount Peter Botte. The north is low, and in part jungle-covered. There are numerous streams, torrents during the rainy season, but at other times of small volume. Volcanic rocks predominate, but coral rock also occurs. The forests, which formerly covered a great part of the island, are now represented by a narrow coast belt of trees, known as the *Pas Géometriques*, and some other Government reserves in different parts. Ebony was formerly abundant, the coco-nut flourishes, and amongst special forms may be noted a species of pandanus, the fibres of which are used for the manufacture of sugar sacks, and the Ravenala, or travellers' tree, found on the plateaux. The only indigenous mammal is the fruit-eating bat; the numerous monkeys, deer and hares have been introduced. The dodo and a large land tortoise which abounded on the island when the first European visitors arrived are now quite extinct. The climate is, on the whole, healthy, but epidemics of malarial fever have occurred, and it appears now to be endemic amongst the native population. The average rainfall may be taken for the lower parts at about 50 inches, but in the high plateaux (at Curepipe) it exceeds 130 inches. Hurricanes sometimes occur, and cause great destruction.

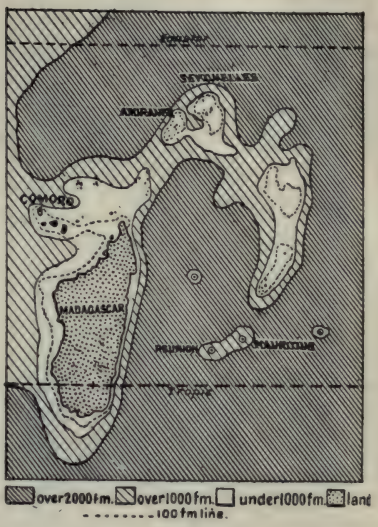

FIG. 482.—*Islands of Western Indian Ocean.*

FIG. 483.—*Mauritius.*

History and Government of Mauritius.—The island was discovered in 1505 by Mascarenhas, a Portuguese navigator, and by him named Cerne, the supposed ancient name of Madagascar; in 1598 a Dutch captain landed at Grand Port, and gave the island its present name in honour of Prince Maurice. In the middle of the seventeenth century the Dutch attempted, unsuccessfully, to make a settlement at Grand Port; many of the slaves whom they brought from Madagascar escaped to the woods, and later these *Marons* caused much trouble to the colonists. In 1715, the Dutch having abandoned the island,

it was taken by the French East India Company. Mahé de Labourdonnais, who arrived as governor in 1735, proceeded with energy and success to develop the resources of the island, establishing Port Louis as the seat of government, introducing the sugar industry, and encouraging the cultivation of cotton and indigo. The colony continued to flourish, and even acquired a degree of local independence, but at the same time it was active in its hostility to British interests and commerce in the east. It was accordingly captured by a British expedition in 1810, and its cession was formally acknowledged by the Treaty of Paris, when Réunion, which had also been taken, was restored to France. The present government is that of a Crown Colony, the entire administration being vested in the Governor; various modifications have, however, been effected at different times, the most important being that of 1885, when a representative element was introduced. The population at the time of the British occupation consisted, besides the French settlers, chiefly of negroes, most of whom had been brought in as slaves. On the abolition of slavery Indian coolies were imported to supply labour, and this has resulted in a great predominance of Indians, who now form two-thirds of the population.

FIG. 484.—*The Badge of Mauritius.*

Trade and Towns of Mauritius.—Agriculture is the only important industry, and sugar-cane is the staple crop. Almost all the necessaries of life have to be imported from India, Australia, Cape Colony and the United Kingdom. The principal export is sugar, which forms nine-tenths of the total. Two lines of railway run through the island. There is regular communication with Marseilles and Ceylon.

Port Louis, the capital and chief town, is situated on the north-west coast. It is enclosed on the land sides by mountains, which cut it off from the prevailing south-east winds, and thus, in part, account for its rather unhealthy character. The houses are built on the slopes of the hills, and there is a good water supply. The harbour is defended by fortifications, and concentrates the foreign trade of the island. *Curepipe*, on the interior plateau, at an elevation of over 1,800 feet, enjoys a cool and healthful climate, and is now the principal sanatorium. There are important botanic gardens and a well-equipped observatory to the north-east of Port Louis.

Amongst the small dependencies of Mauritius which cannot be further noticed are the St. Brandon Isles, Aldabra, noted for its large land tortoises, and the Amirantes Islands, yielding coco-nut oil.

STATISTICS.

	1881.	1891.	1901.
Area of Mauritius Island (in square miles)	705 ..	705 ..	705
Population of Mauritius	360,411 ..	370,934 ..	378,195
Density of population per square mile	511 ..	526 ..	536
Population of Port Louis (with suburbs)	70,000 ..	62,046 ..	52,740

ANNUAL TRADE OF MAURITIUS (*in dollars*).

	1871–75.	1881–85.	1891–95.
Imports	11,965,000	13,440,000	15,950,000
Exports	15,280,000	18,870,000	13,335,000

The Seychelles.—The Seychelles archipelago lies 930 miles north of Mauritius, in about 4° S. The group consists of thirty-four islands, many of which are merely uninhabited rocks. They are mountainous, composed of volcanic rock, and rising to nearly 3,000 feet, well-watered and fertile, with groves of coco-nut palms and fine timber trees, and capable of producing all kinds of tropical plants. The characteristic product of the group is the *coco de mer*, a kind of double coco-nut, which grows only in two of the islands (Praslin and Curieuse), and is found nowhere else in the world. Coco-nut oil is the staple product, and vanilla is an important culture. The islands are surrounded by coral reefs. The climate is excellent. Mahé, the principal island, has on the north-east *Port Victoria*, the small capital, with a fine, sheltered harbour.

The islands, said to have been discovered by the Portuguese in 1505, were explored, by direction of Labourdonnais, in 1743, and a few years later were annexed by France. In 1794 they were taken by the British. The majority of the inhabitants are of African descent; the few whites are chiefly of French origin.

Rodriguez.—Rodriguez lies 350 miles east of Mauritius in 19° 40′ S. It is of volcanic origin, mountainous (rising to 1,760 feet), exceedingly picturesque, and possessing in the south-west beautiful stalactite caverns. It is well-watered, fertile and enjoys a good climate. Maize, fruits and vegetables of various kinds are cultivated; cattle and goats are reared, and fishing is an important industry. The inhabitants are chiefly African. The island was discovered early in the sixteenth century by a Portuguese, Diego Rodriguez. In the eighteenth century it was occupied by the French, and in 1809 seized by the British as a base of operations against Mauritius.

The Chagos Archipelago.—Oil Islands is the general name given to various scattered groups, which have no physical connection, lying between 6½° and 10° S., and between 77° and 48° E., including the Chagos, Eagle or Trois Frères, and Cosmoledo Island. They are mainly used for the production of coco-nut oil, and are for the most part exploited by Mauritian proprietors. The inhabitants are few, chiefly African and Malagasy, and are under the jurisdiction of a travelling stipendiary magistrate, representing the Mauritius government. Diego Garcia, one of the Chagos group, in 7° S., is a coral atoll enclosing a fine harbour, of special importance as a coaling station on the routes between the Red Sea and Western Australia, and between Mauritius and Ceylon.

III.—RÉUNION.

By M. Zimmermann.

Réunion.—The island of Réunion, formerly called Bourbon, situated in 21° S. and 55½° E., near Mauritius, is one of the Mascarene group lying 420 miles to the east of Madagascar (Fig. 482). It is entirely volcanic, although there are no longer active volcanoes in the north-western part where the eroded cliffs of lava surround great corries, or cirques, formed by subsidence, and rise in rugged peaks over 6,500 feet in height. The Piton des Neiges attains an altitude of 10,070 feet. Volcanic activity still manifests itself in the south-east, where the Piton de la Fournaise reaches the height of 8,200 feet. Most of the inhabitants live near the coast, on which there are many small towns, while in the interior, more than 2,500 feet above the sea, the sanatoria of *Salazie* and *Hellbourg* are situated on the windward, or north-eastern, side of the island. The mean annual temperature on the coast at St. Denis is 78° F., and the rainy season lasts from December to April. The island was occupied by the French in 1664, and, thanks to the richness of the coffee plantations, it was one of the most successful of the colonies of the early period. In the nineteenth century the place of coffee as a staple production was taken by sugar, and the planters prospered greatly for a time, although now the competition of beetroot sugar has almost ruined the island. The production fell from 82,000 tons of sugar in 1860 to 34,000 in 1894; in the same period the trade of the colony diminished to one-fifth of its former amount, and the population is also falling off. In addition the suppression of slavery and the institution of universal suffrage have transferred political power from the whites to people of colour: Chinese, Malays, Hindus and Arabs. A railway runs from *St. Benoit* on the north-east coast to the capital, *St. Denis*, in the north, and continues round the coast to *St. Pierre* on the south-west; it is remarkable for the number and length of its tunnels.

Remote Dependencies.—The lonely volcanic islets of St. Paul and Amsterdam, situate about 37° S. in the Indian Ocean, midway between Africa and Australia, and the desolate island of Kerguelen in 50° S. and 70° E., are recognised as French possessions. The islands have hitherto been little visited, except occasionally by sealing and whaling ships. Kerguelen has, however, been touched at by various scientific expeditions, including those of the *Challenger* and *Valdivia*, of the astronomers who observed the Transit of Venus there in 1874, and the German Antarctic Expedition, which kept up a magnetic observatory during 1902.

STATISTICS (about 1895).

Area of Réunion, in square miles	965
Population	172,000
Density of population per square mile	178
Population of St. Denis	26,000

STANDARD BOOK.

M. Mounier. "Crags and Craters; Rambles in the Island of Réunion." London, 1896.

BOOK VII.—THE POLAR REGIONS

CHAPTER LIV.—THE NORTH POLAR REGIONS

I.—THE ARCTIC RECORD

By Sir Martin Conway.

Arctic Exploration.—The earliest venture in Arctic exploration was the voyage of Pytheas beyond the British Islands about B.C. 300, when the first rumours of the frozen sea and the Arctic night were heard. The voyage of the Norseman Othere, who about A.D. 840 rounded the North Cape and reached the White Sea, is of special interest, as being recorded by King Alfred the Great in a note on his translation of Orosius' History of the World ; this was the first record of geographical discovery in the English language. A new period of exploration was introduced by the desire to find a northern passage to Asia under the stimulus of the voyages of Columbus, Vasco da Gama, and Magellan ; this led to the development of an extremely valuable trade in cod, seals and whales, which introduced the period of whaling voyages, and the associated cruises of men-of-war sent north by various governments to assist vessels in distress or to explore and protect the fishing grounds. A period of great scientific expeditions next ensued, sent out by governments for the purpose of investigating terrestrial magnetism and conditions of climate, which merged into the still current period of small private, or semi-private expeditions animated by scientific or adventurous motives, and each usually dependent on some definite theory or plan.

The Search for a Northern Passage.—The voyage of Cabot in 1497 was the first which set out with the intention of finding a way to the Indies by the North-west. It resulted in the discovery of the Newfoundland fisheries and the continent of North America. In 1553 the expedition of Willoughby and Chancellor, and in 1580 that of Pet, to find a passage round the north of Asia failed to get beyond the entrance of the Kara Sea, but opened up the profitable trade of the Muscovy Company with the White Sea. Meanwhile Sir Martin Frobisher made a dashing cruise to the westward, and, misled like all the voyagers in northern seas of his period by the errors of the map of the Zeni, believed that he had discovered the beginning of the passage in the deep bay which now bears his name. In 1578 Sir Francis Drake, finding it prudent after a privateering voyage against the Spanish ports on the Pacific coast of South America to return

to England by an unfrequented route, spent some time in a vain search for the hypothetical Strait of Anian from the Pacific side.

Towards the end of the sixteenth century the merchants of London and of Holland took up the question of a North-west or North-east Passage very seriously. John Davis was sent out successively in 1585, 1586, and 1587, and as a result of his explorations he pointed to the entrance of Hudson's Bay as one possible route, and passing northwards up Davis Strait he reached 72° N. on the west coast of Greenland, where he reported "no ice to the north, but a great sea, free, large, very salt and blue and of an unsearchable depth." He named the headland at which he turned "Sanderson his hope of a North-west Passage to India," and Sanderson's Hope it remains to-day. Barents, a heroic Dutch pilot, made three great voyages between 1595 and 1597, which cannot be better summarised than in the title-page of the English translation of his story:—

"The True and Perfect Description of three voyages so strange and woonderful that the like, hath never been heard of before. Done and performed three yeares, one after the other, by the ships of Holland and Zeland, on the north sides of Norway, Muscovia, and Tartaria, towards the Kingdomes of Cathaia and China: shewing the discoverie of the straights of Weigates, Nova Zembla, and the country lying under 80°; which is thought to be Greenland,[1] where never any man had bin before: with the cruell Beares and other monsters of the Sea, and the unsupportable and extreame cold that is found to be in those places. And how that in the last voyage the shippe was so enclosed by the Ice that it was left there, whereby the men were forced to build a house in the cold and desart country of Nova Zembla, wherein they continued ten monthes together, and never saw nor heard of any man, in most greate cold and extreame miserie; and how after that, to save their lives, they were constrained to sail over 350 Dutch miles which is above 1000 miles English, in little open boates, along and over the maine Seas, in most great daunger, and with extreme labour, unspeakable troubles and great hunger."

Barents, brave and cheerful to the end, died on the boat voyage, the first of a long series of Arctic victims.

Hudson in 1607 sailed due north between Greenland and Spitsbergen in the attempt to reach Japan across the pole. He reached the farthest north so far attained, 80° 23′. In 1613, when following up Davis's western route, he was cast adrift by a mutinous crew in the bay which perpetuates his name. Baffin, the most successful of the many who sought for a passage from Davis Strait in those years, traced the outline of that gulf north to 77° 35′, pointing out and naming the entrances of Smith and Jones Sounds, and as he believed it to be closed to the northward it came to be called Baffin Bay. For 236 years no other navigator went so far in that direction; and attempts to find a North-west or North-east Passage were

[1] This was Spitsbergen.

gradually given up. Russian travellers traced out the north coast of Asia on land ; Dezhneff in 1648, and Vitus Bering in 1728 made pioneer sea-excursions through Bering Strait. The employés of the Hudson Bay Company subsequently performed the same service for the north coast of America, Mackenzie tracing the Mackenzie River to the sea in 1798.

The Whaling Cruises.—During the seventeenth and eighteenth centuries and the first thirty or forty years of the nineteenth, large whaling fleets visited the seas east of Greenland and Davis Strait every year, and many of the ships sailed far to the north. Two of the British government expeditions in the eighteenth century are specially memorable ; that under Phipps in 1773 (accompanied by the great Nelson as a midshipman), which reached 80° 48′ north of Spitsbergen, and that under Captain Cook on his third voyage in 1776, when he tried in vain to force a way first eastward and then westward from Bering Strait.

The greatest of the whalers was Scoresby, a master in his craft and one of the most fortunate, an earnest student of nature and a keen explorer. He traced out much of the almost inaccessible east coast of Greenland and in 1806 he carried his ship to the farthest north of the period, 81° 30′. In connection with whaling many government expeditions were sent out to investigate the conditions of ice-navigation, to relieve distressed and shipwrecked crews, or to search for new and profitable whaling grounds.

In one of the few expeditions which set out with the avowed purpose of trying to reach the pole Sir Edward Parry, in 1827, sailed north of Spitsbergen, and by sledging over the ice-floes succeeded in reaching the remarkable latitude of 82° 45′. He continued to struggle on until he found the southward drift of the floes in the East Greenland current carried him more miles to the south in one day than his men were able to drag the sledges northward. During the previous century the Arctic seas had become familiar to seafaring men to an extent that it is now difficult to realise, and it was a common thing for many vessels to winter in the ice.

The Achievement of the Northern Passages.—Scoresby's discoveries revived the dormant interest in Arctic exploration, and in 1818 Sir John Ross was sent out by the British government to search for a North-west Passage by sea. Ross explored Baffin Bay, but failed to find its northern opening, although he met and for the first time described the most northerly tribe of Eskimo. Mistaking Lancaster Sound for a closed bay, he returned without adding to the knowledge of the north-west. In the following year Sir Edward Parry was sent out with the *Hecla* and *Griper*, and succeeded in penetrating Lancaster Sound, threading the channels of the Arctic archipelago to the entrance of Banks Strait, and thus earned a reward of £5,000 offered by the British government to the first Arctic explorer who passed 110° W. Several subsequent voyages led to no advance on this journey. In 1829, on a private expedition under Sir

John Ross, his nephew, Sir James Clark Ross, fixed the position of the North Magnetic Pole on the peninsula of Boothia Felix in 70° 5′ N. and 96° 44′ W. For ten years small parties under conditions of extraordinary hardship continued to trace out the Arctic coast of North America by land, Sir John Franklin, Sir George Back, Sir John Richardson, and Mr. T. Simpson won fame from their heroic and successful efforts in this field.

In 1845 a finely-equipped expedition sailed from England in the *Erebus* and *Terror*, which had just returned from their successful Antarctic voyage, and Sir John Franklin, although fifty-nine years of age, insisted on taking command. His instructions were to use every effort to reach the Pacific from Lancaster Sound. On July 26, 1845, the vessels were spoken by a whaler in Davis Strait: they were never seen again. In 1848 anxiety as to the explorers became acute, and vigorous efforts were made by land and sea, through government and private expeditions, to discover their fate. As a result no part of the Arctic regions has been so minutely explored as that to the north of America. Ships were sent out both by Lancaster Sound or Hudson Bay and by Bering Strait with orders to leave nothing undone which might throw light on the fate of the *Erebus* and *Terror* and their crews. McClure in the *Investigator* entering Bering Strait in 1850, made his way eastward to Barrow Strait, where the ship grounded, and after wintering two years the party left it and travelling over the ice returned to England by a vessel from Baffin Bay. The North-west Passage was not made again until 1905, by Amundsen. The numerous naval expeditions sent out through the straits leading off Baffin Bay encountered an almost unparalleled succession of misfortunes, but many magnificent pieces of exploration resulted, amongst them the sledging journeys of Sir Leopold McClintock, which have never been surpassed. In 1854 Dr. John Rae on a land journey learned from the Eskimo that a great disaster had occurred, and that the Franklin expedition was totally lost. In the following year the British Admiralty gave up the search, which was, however, pursued with increased energy by private effort directed by the determination of Lady Franklin. In 1857 Sir Leopold McClintock sailed in the steam yacht *Fox*, was beset by ice in Melville Bay and drifted 1,200 miles to the southward in the Arctic current before getting free; but the voyage was at once resumed and finally crowned with success. In the spring of 1859 he discovered, in a cairn on King William Land, the only document relating to the Franklin expedition ever found. It stated that Franklin died in June, 1847, and that the ships had been deserted in April, 1848, off the north coast of King William Land, after having been beset in the ice for eighteen months, the crews intending to retreat over the ice to the mainland of North America. Not one survived, and the tragic story remains shrouded in mystery. Yet these men had "forged the last link of the North-west Passage with their lives," for the ships had reached waters navigable to the Pacific.

In curious contrast to the sufferings in the North-west, the record of the single achievement of the North-east passage is one of unclouded success. Baron A. E. Nordenskiöld sailed from Tromsö with a Swedish expedition in the *Vega* in June, 1878, passed through the Kara Sea, rounded Cape Chelyuskin, and was stopped by the winter ice when within 120 miles of Bering Strait, which was entered in July, 1879, and so the first and last voyage to Eastern Asia by way of the Arctic Sea was accomplished.

Expeditions of the "Alert" and "Discovery."—Between 1852 and 1860 Sir Edward Inglefield, Dr. Elisha Kent Kane, and Dr. Isaac J. Hayes, in the British and American Franklin Search expeditions, explored Smith Sound to the northward, and Hayes believed that he had seen a great open Polar sea. In 1870 another American expedition under Hall went still further, and penetrated in the *Polaris* to 82° 11′, where Robeson Channel widens into the Arctic Sea. So promising did this route appear that in 1875 a great Polar expedition was fitted out by the British government in the *Alert* and *Discovery*, and placed under the command of Sir George Nares, who was recalled from the scientific circumnavigation of the *Challenger* for this purpose. Making his way through Smith Sound and the northern channels with much difficulty, for the ice was unfavourable, Nares wintered in 82° 25′ N., on the edge of the Palæocrystic Sea, as he termed the hummocky ice-blocks which beset the margin of the Arctic Sea. His sledging parties traced out the extreme northern coast-lines for hundreds of miles, and on one expedition Commander (now Rear-Admiral) Albert Hastings Markham succeeded in reaching 83° 20′, a higher north latitude than had ever before been obtained; but the sledge parties suffered terribly, scurvy, the bugbear of Arctic travellers, having appeared. Scientific observations of great value in geology, natural history, and especially in meteorology and on the tidal conditions of the Arctic Sea, were made continuously.

FIG. 485.—*The Smith Sound Region.*

International Circumpolar Observations.—Shortly after the return of the expedition, and of Payer and Weyprecht from their discovery of Franz Josef Land, a scheme was set on foot by the German government for the systematic and simultaneous international study of the physical conditions round the whole border of the unknown polar areas. The plans were settled at two International Polar Conferences held at Hamburg, under the presidency of Dr. George Neumayer, in 1879, and at Bern in 1880; they included complete meteorological and physical observations at special stations situated as far north as possible for a full year, with simultaneous observations at a number of permanent observatories in all parts of the world. The stations which were ultimately

established are enumerated with various particulars in the accompanying table, and it is to be noted that French and German expeditions were sent at the same time to Tierra del Fuego and South Georgia to obtain similar records for the Antarctic area.

THE INTERNATIONAL CIRCUM-POLAR STATIONS.

Lat. N.	Long.	Place.	Duration	Leader.	Nationality.
78° 28′	16° E. ...	Spitsbergen	July, 1882–Aug., 1883	Ekholm ...	Swedish.
69° 56′	23° E. ...	Bossekop ...	June, 1882–Aug., 1883	Steen ...	Norwegian.
67° 24′	26° 36′ E.	Sodankyla ...	Aug., 1882–Sept., 1883	Lemström, &c.	Finnish.
72° 25′	52° 44′ E.	Novaya Zemlya	Aug., 1882–July, 1883	Andreyeff ...	Russian
71° 0′	64° (*approx.*)	Kara Sea ...	Sept., 1882–Sept., 1883	Hovgaard ...	Danish.
73° 23′	124° E. ...	Lena delta ...	Aug., 1882–July, 1884	Jurgens ...	Russian.
71° 16′	158° 40′ W.	Pt. Barrow ...	Sept., 1881–Aug., 1883	Ray ...	United States.
62° 39′	115° 44′ W.	Fort Rae ...	Sept., 1882–Aug., 1883	Dawson ...	British and Canadian.
81° 44′	64° 45′ W.	Grinnell Land	Aug., 1882–July, 1883	Greely ...	United States.
66° 36′	67° 192′ W.	Kingawa Fjord	Aug., 1882–Aug., 1883	Giese ...	German.
64° 11′	51° 40′ W.	Godthaab ...	Aug., 1882–Aug., 1883	Paulsen ...	Danish.
70° 0′	8° 28′ W.	Jan Mayen ...	July, 1882–Aug., 1883	Wohlgemuth	Austro-Hungarian.

The most remarkable of these expeditions was that led by Lieutenant (now General) A. W. Greely, of the United States Army. In addition to carrying out the programme of the international observations at the most northerly station, he and his party explored Grinnell Land and other lands, and made long sledge journeys towards the Pole, the highest latitude attained by Lieutenant Lockwood and Sergeant Brainard being 83° 24′, about four miles beyond Markham's farthest. The expedition sent to bring Greely's party home failed through mismanagement, and his retreat was one of the most disastrous and heroic in the annals of Arctic travel. Most of his men died of disease or starvation, and the surviving six were only rescued when at the last extremity.

The "Tegetthof" Expedition.—In 1872 an Austro-Hungarian expedition was sent out by the generosity of Count Wilczek under the command of Lieutenant Weyprecht for sea service and Lieutenant Payer for land exploration, with the object of attempting to cross the Polar area from the neighbourhood of Novaya Zemlya. Off that island in August, 1872, their ship, the *Tegetthof*, was beset in the ice in 76° 22′ N., and drifted with the wind and currents on the whole northward and westward for a year. Thus they were carried in August, 1873, to an unknown archipelago (Franz Josef Land), where the helpless vessel remained fast for nearly another year. Payer made extensive explorations with dog-sledges, and reached Cape Fligely, 82° 5′ N., as his farthest point. The expedition abandoned the *Tegetthof* in May, 1874, and returned safely in boats to Novaya Zemlya. Mr. Leigh Smith, in the Arctic yacht *Eira*, succeeded in reaching Franz Josef Land easily in 1880, and extended the explorations; but on returning in the following year the *Eira* was lost, and Mr. Smith and his party passed the winter in an improvised hut as bravely as Barents three centuries before, escaping during the next summer by a daring boat journey across the open sea to Novaya Zemlya. Another British expedition, fitted out by Mr. A. C. Harmsworth, under the leadership of Mr. F. G. Jackson, spent

three years in Franz Josef Land in 1894–97, accumulating scientific observations.

The Drift of the "Jeannette" and of the "Fram."—Wrangell Land, discovered by an American whaler to the north-west of Bering Strait in 1867, was at first believed to stretch far towards the Pole. In 1879 Captain W. G. De Long, of the United States Navy, passed through Bering Strait in the *Jeannette*, intending to winter on this land; but his vessel was caught in the ice and drifted north-westward, passing north of Wrangell Land, which proved to be a small island. For nearly two years the *Jeannette* drifted northward and westward, but was crushed by the pack ice, and sunk in June, 1881, when in 77° 15′ N. The crew retreated over the ice with boats and sledges to the New Siberian Islands, and thence to the Siberian coast, where the leader and most of his company perished from hardship and starvation. In June, 1884, some objects were found on an iceberg off Julianehaab, in the south-west of Greenland, which appeared to belong to the lost *Jeannette*. Some authorities believed that the relics did not come from that ship, but others, including Dr. Fridtjof Nansen, maintained that the ice had really drifted across the Polar area and out into the East Greenland current. Confirmed by other pieces of evidence, Dr. Nansen concluded that there is a regular drift across the Pole from the Asiatic to the Greenland side, and he planned an expedition to take advantage of it. Scurvy, the curse of most previous Arctic journeys, he proposed to avoid by the scientific composition of the food carried; the risk of his ship being crushed in the ice was to be evaded by the form of the vessel, which would cause it to be lifted out of the water by the pressure of ice on its sides; there was to be no battling against drifting ice or hostile currents because he was to "take a ticket with the ice," running into the pack near the place where the *Jeannette* sank. If these arguments and expedients, suggested by the history of Arctic voyages and disasters, were correct and sufficient, he expected to return in three years. In August, 1893, with twelve companions, Nansen sailed in the *Fram* ("Forward"), coasted the north-west of Asia, and entered the ice-pack in 78° 45′ north of the New Siberian Islands in autumn. In the summer of 1895, when the ship, resting securely on the surface of the ice, had drifted to 84° N., Nansen and one companion, Lieutenant Johansen, left her and travelled northward on *ski* with dog-sledges until compelled to turn. The "Farthest North" attained on the sea-ice was 86° 14′, a point within 250 miles of the Pole. They reached one of the islands of the Franz Josef Land group, in time to pass the winter of 1895–96 in a shelter, half-cave half-hut, living on the flesh of polar bears and walruses. In the early spring they met Mr. Jackson, and returned in his steamer in August, 1896. By the most remarkable coincidence in Arctic history, the *Fram* broke out of the ice north of Spitsbergen on the very day when Nansen arrived at Vardö; she had drifted exactly in the manner foreseen, and the fortunate thirteen returned

to Christiania in perfect health on the uninjured *Fram*. Scientific results of the highest importance had been obtained, and an advance made of 3° of poleward progress.

Other recent Expeditions. Nansen crossed the ice-covered plateau of Greenland from east to west for the first time in 1888. Mr. R. E. Peary, civil engineer in the United States Navy, landed in 1891 on the west coast of Greenland, north of Melville Bay, where he wintered, and in 1892 made a splendid journey across the northern edge of the inland ice to Independence Bay on the north-east coast, a distance of 600 miles, afterwards returning to his base. In 1895 he succeeded in again reaching Independence Bay in very bad conditions of weather, with the loss of all his stores, and only the timely discovery of musk oxen saved him and his companion from starvation; but the further advance he had hoped to make was impossible. With extraordinary perseverance he continued to spend year after year in the far north endeavouring, though without much result, to train the native Eskimo for long journeys over the frozen sea, and although he came home in 1902, his plans were not abandoned. In 1896 and 1897 the writer explored the interior of Spitsbergen, and crossed it for the first time; and in 1898 Professor Nathorst circumnavigated that island group, and definitely established the geography of the region between it and Franz Josef Land. An attempt by the Swedish engineer Andree to cross the North Polar area in a balloon must be classed with the mysterious tragedies of exploration. On July 11, 1897, he ascended in the north of Spitsbergen with two companions, and drifted away to the north. Pigeon messages dated two days later showed that the direction of progress had been north-easterly; no trustworthy news has since been received. The Duke of the Abruzzi with a well-equipped expedition in the *Stella Polare* wintered to the north of Franz Josef Land in 1899–1900, and one of his staff, Captain Cagni, succeeded by a splendid sledge journey in reaching 86° 34′ N. on the frozen sea, the farthest north yet attained. An American expedition to the same region in 1902 led to no advance in knowledge, but prepared the way for future exploration. Captain Sverdrup spent the years 1898–1902 exploring the Arctic Archipelago west of Smith Sound, and Commander Peary attained the "farthest north" of 87° 6′ in the *Roosevelt* in 1906.

There is no reason to fear a cessation of enterprise in this direction until the North Pole is reached, and that sentimental incentive withdrawn. If this consummation is delayed for many years, the exploration of the Arctic regions will probably be much more thorough, and eventually more complete than if some fortunate adventurer quickly succeeds in reaching the coveted latitude of 90°. The commercial motive to Polar exploration has practically gone with the collapse of the whaling industry, and only science and adventure continue to tempt men into the unknown remoteness of "the white North."

STANDARD BOOKS.

A. W. Greely. "Handbook of Arctic Discoveries." New York and London, 1896.
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———— "Life of John Davis the Navigator" (includes historical references). London, 1889.
A. Chavanne and others. "Die Literatur über die Polar-Regionen der Erde" (over 6,000 titles). Vienna, 1878.
Sir John Barrow. "Chronological History of Voyages into the Arctic Regions." London, 1818.
———— "Voyages of Discovery and Research within the Arctic Regions from the year 1818 to the present time." London, 1846.
A. H. Markham. "Life of Sir John Franklin" (includes a summary of the Franklin Search). London, 1891.
Note.—A very full list of narratives of voyages will be found in Greely's "Handbook."

II.—THE ARCTIC REGIONS

BY DR. FRIDTJOF NANSEN, G.C.V.O.,

Norwegian Minister in London.

Definition.—The Arctic circle, in 66° 32′ N., forms the southern limit of the circumpolar region, inside which the Sun does not set during some part of the summer (giving the perpetual Polar day with the midnight Sun), and where the Sun does not rise some part of the winter (giving the Arctic or Polar night). This region is called the Arctic or North Polar region. As the distance of the Arctic circle from the pole is 1,408 geographical miles,[1] the diameter of this region is 2,816 miles; and its total area is 8,201,883 square miles, more than one-fourth of which is still unknown. Taking it as probable that this unknown region is principally sea, it must strike one upon looking at a circumpolar map of the Arctic region how by far the greater part of this area is covered by sea, whilst the land principally forms a circular fringe along its outer margin, being the northern terminations of the two great continental masses of the world—the European-Asiatic and the American-Greenland. Thus the Arctic circle, which is 8,640 miles long, passes about four-fifths of its distance over land and only about 1,800 miles over water; the principal parts of this water are the Norwegian-Greenland Sea (the broad gap between Norway and Greenland), Davis Strait, and Bering Strait which are the three entrances from the open ocean into the Polar Sea.

The Arctic Sea.—The Polar or Arctic Sea must be considered as a branch of the Atlantic Ocean; it is a large gulf extending as a deep depression northwards between Norway and Greenland. The width in its narrowest part, between the Lofoten Islands (Norway) and Shannon Island (east coast of Greenland), is about 700 miles; but further north it broadens out to cover the whole central part of the Arctic region. On the other side of the Pole, just opposite Norway, it has a quite narrow communication with the Pacific Ocean through Bering Strait, 49 miles broad and only 27 fathoms deep. The Polar Sea is quite shallow along

[1] The geographical, nautical, or sea-mile used throughout this article is one-sixtieth of an equatorial degree.

its whole margin, a shallow submarine plateau extending some distance northwards from the continents on both sides. These plateaux, or drowned plains, evidently mark an old extension of these continents, remnants of which still exist as the Arctic lands, Spitsbergen, Novaya Zemlya, Franz Josef Land, the New Siberian Islands, and the American Arctic Archipelago. Between Spitsbergen and Norway this plateau is in the deepest part 260 fathoms under the sea-surface; in the Barents Sea, between Spitsbergen, Franz Josef Land, and Novaya Zemlya, the depth is about 100 to 160 fathoms. The deepest depression on this plateau, 400 fathoms, occurs just east of Vaigach Island in the Kara Sea. Along the whole Siberian and American coasts its depth is less than 100 fathoms. Its northern limit is not known on the American side. On the Siberian side, east of the New Siberian Islands, it still exists in 77° N. or 350 miles from the main land, with no greater depth than 80 fathoms, and generally much less. North of the New Siberian Islands the plateau, with depths of 50 fathoms or less, extends a similar distance north from the mainland to nearly 79° N., where the bottom suddenly sinks to form a deep sea, with depths of 2,000 fathoms. The northern and eastern extension of this sea is still unknown, but westward we know it extends north of Franz Josef Land and Spitsbergen, with depths of more than 1800 fathoms (probably much more), and the plateau on which these lands are situated probably sinks abruptly not very far to the north of the known land. In 84½° N. north-east of Franz Josef Land (about 75° E.) the depth is 2,020 fathoms. From the north-west corner of Spitsbergen a submarine ridge with depths of 400 and 430 fathoms extends for an unknown distance in a north-westerly direction. It may separate the great depths of the Arctic Sea from those in the Greenland and Norwegian Sea, the deepest part of which is the Swedish Deep of 2,650 fathoms, west of Spitsbergen (78° N.). This depression is separated from the great depths of the Atlantic Ocean by the shallow Færoe-Icelandic (or Wyville Thomson) submarine ridge (250 to

FIG. 486.—*The Arctic Regions.*

300 fathoms deep), passing from Scotland by the Færoes and Iceland to Greenland.

West of Greenland there is another gulf, extending from the Atlantic Ocean for 1,170 miles northward into the Arctic region, in its southern part called, Davis Strait, in its northern, Baffin Bay. Like the Arctic Sea, it has a submarine ridge or barrier in the south, whilst it is very deep further north. Davis Strait is in its narrowest part, between Holstenborg, in Greenland, and Cumberland Peninsula (Baffin Land), 160 miles broad, and only about 120 fathoms deep. Baffin Bay, somewhat broader and very deep, is in communication with the Polar Sea by the narrow channels of Smith, Jones, and Lancaster Sounds.

Circulation of the Arctic Sea.—The circulation is very much the same in both these branches of the Atlantic Ocean. On the right hand or eastern side a comparatively warm current runs in; on the left hand or western side a cold current runs out. This condition is to a great extent caused by the rotation of the Earth. A part of the Gulf Stream runs through the strait between the Færoes and Scotland, northward along the north-west coast of Norway and the west coast of Spitsbergen, into the Polar basin. The depth of the channel between the Færoes and Scotland is between 400 and 500 fathoms, which determines the depth of the current. The northern branch of the Gulf Stream keeps the same depth even far north in the Polar Sea. On the west coast of Spitsbergen it is found to be about 110 miles broad, and 400 to 500 fathoms deep. The temperatures of the water are between 32° and 38° F.

The course of the Gulf Stream drift inside the Polar basin is not well known; probably it runs north-east and east, north of Spitsbergen and north of Franz Josef Land. As the cold surface water is diluted by additions of fresh water from the Siberian and American rivers running northward into the Polar Sea, it is less saline and lighter than the warmer, but more saline Gulf Stream water, which consequently sinks under the cold surface layer. In the sea north of Spitsbergen, in about 84° N., the warm Gulf Stream water is found filling the space between 100 fathoms and 490 fathoms depth, with temperatures above 32° (from 32° to 34° F.). The current consequently reaches to the same depth as further south. North of Franz Josef Land, in 85½° N. and 60° E., the temperature of the water between 100 fathoms and 450 or 500 fathoms is also above 32°. As far east as north of the New Siberian Islands, in 81° N. and 130° E., we find almost the same thing: between 120 fathoms and 380 fathoms depth the temperature of the water is above 32° (32° to 33°). How the conditions are in this respect in the rest of the Polar basin is unknown. It receives another though comparatively insignificant contribution of warm water through Bering Strait, where the temperatures are from 37° to 48° F. The water running out of the Polar basin is mostly very cold. The water of the East Greenland Polar current running southward along the east coast of Greenland has temperatures between 31·8° and 29·3°, only quite near the

Greenland coast there is a thin layer of warmer water in about 100 fathoms depth, with temperatures from 32° to 32·8°.

If we consider the Barents Sea separately we find in it the same conditions as in the Greenland Sea, a warm current forming a branch of the Gulf Stream running in on the right hand (*i.e.*, the southern side) eastward round the North Cape in Norway, and a cold current running out on the left hand (*i.e.*, the northern side) along the south coast of Franz Josef Land and the south-east coast of Spitsbergen. Whether much of the warm water actually enters the Polar basin through the opening between Novaya Zemlya and Franz Josef Land may be considered as doubtful.

In Davis Strait a current runs north on its east side along the west coast of Greenland, consisting partly of warm Atlantic water, partly of water from the East Greenland Polar current which rounds Cape Farewell and runs west and north-west along the western coast, carrying drift ice with it for some distance, until the floes are broken up and melt, exposed to the warmer Atlantic water ; and they seldom come further north than Godthaab, in about 64° N. On the west side of Davis Strait a cold Polar current flows out from Baffin Bay southward along the east coast of Baffin Land, carrying much drift-ice as well as Greenland icebergs out past Newfoundland. This polar current is not only formed by the water running north on the east side of Davis Strait, but it receives also contributions through Smith Sound, Jones Sound, and Lancaster Sound, where the currents run into Baffin Bay.

Ice Conditions of the Arctic Sea.—The warm and cold currents of the Arctic Sea naturally determine the formation and distribution of the sea-ice or drift-ice. Where warm currents run in northwards there is but little ice formed, and the ice is carried away northward ; thus we find no ice on the north coast of Norway, comparatively little on the west coast of Novaya Zemlya, and generally none in summer on the west coast of Spitsbergen, and comparatively little even in winter. As may be expected, it is in this region that open sea is found furthest north ; in favourable seasons open water may occur at least as far as 82° N. north of Spitsbergen. In Davis Strait and Baffin Bay the conditions are not so favourable, but in good seasons the west coast of Greenland is nearly free of ice as far north as Smith Sound. West and north-west of the New Siberian Island there is much open water in summer, extending at least to 79° N. On the East Siberian and Alaskan side of the Polar basin there is comparatively little open water. North of Bering Strait it seldom extends much higher than 73° N.

Where the cold polar currents run out or southward we generally find much ice, which is constantly being carried out of the Polar Sea, and often far south. Thus the south coast of Franz Josef Land, the east and south-east coasts of Spitsbergen are blockaded most part of the year by drift-ice. The same is the case along the whole east coast of Greenland,

where the ice is carried south of Cape Farewell. Along the east coasts of Baffin Land and Labrador masses of floe-ice are carried still further south.

The distribution of the ice varies during the year, not only because of the difference in the melting on account of the variation of solar heat in summer and winter, but also to a great extent on account of the seasonal changes in the winds and currents. Observations are, however, lacking on this subject. The interior Polar Sea or the Polar Basin is mostly covered with floating ice, which does not form a continuous or unbroken ice-sheet, as it is always being broken up into floes by the winds and tidal currents. This ice is in constant motion, mainly on account of the winds. The winds often change their direction, and before the direction of the drift of the ice can be changed, the result may be heavy ice pressures, breaking and piling up the ice in ridges and hummocks. Such pressures also arise from the changing tide-currents, especially at spring-tide. This is principally the case near the outskirts of the Polar Sea. The average direction of the winds during the year is from the Siberian and Bering Strait side towards the Greenland side of the Polar Basin. The drift ice is consequently yearly being carried across the Polar Sea in this direction, and is either carried southwards along the east coast of Greenland, or is choked up against the north coast of Greenland, Grinnell Land, and the American Arctic Archipelago, perhaps at last to find its way out through some of the channels.

Icebergs.—Icebergs are quite different in their origin and formation from the sea-ice or floe-ice, and occur only in the outskirts of the Arctic Region, especially in Greenland and Labrador waters. While the floe-ice is formed on the surface of the sea, icebergs originate from the glaciers, and are formed on land. Their height above the sea may be 200 feet or more, about eight times the bulk of ice seen above water is submerged, thus the weight of a single berg may be millions of tons. Most of them are formed in the glacier-fjords on the east and west coast of Greenland. By the Polar current they are carried southward along the east coast, round Cape Farewell. On the west coast they drift northward until they are all carried across Davis Strait or Baffin Bay into the Labrador current, which floats them southward into the Atlantic Ocean, where they form a well-known danger.

Climate.—The physical condition of the Arctic regions is mainly affected by the climatic conditions, but our knowledge in this respect is still so deficient that it is very difficult to make any useful generalisation. The atmospheric pressure and the wind regulate the movements of the currents and drift-ice. These conditions regulate the temperature and the precipitation, which again regulate the formation of ice and the accumulation of snow into glaciers and ice-caps. At the same time the temperature, the currents and the distribution of ice affect the winds.

Arctic Winds.—The winds of the Arctic regions taken as a whole, cannot be said to be very strong, neither can the Arctic region as a whole

be said to be very windy. But on the outskirts in such places as Franz Josef Land, Novaya Zemlya, Spitsbergen, and also Greenland, where there is an immense expanse of ice-covered sea or land on one side, whilst the open sea is not far off on the other, the climatic conditions are unsettled, and strong gales may be very frequent, especially in winter. These gales also bring sudden changes of temperature, and rises of more than 35° F. in less than a day are not uncommon. Remarkably warm winds sometimes occur on the coast of Greenland ; they are, however, mere local phenomena akin to the föhn of the Alps. Fogs and precipitation are frequent. In the interior of the Polar Basin the climate is quite different. Over these extensive plains of ice-covered sea the climatic conditions are very uniform and have great stability. Gales are comparatively rare, and are never strong. The same clear weather, especially in the winter, with comparatively little wind may last almost continuously for weeks or even months. The temperature varies very little, though a strong wind nearly always brings a rise of temperature. Fogs are only formed in the late summer, when there is much fresh water in ponds on the top of the ice, and many open channels between the floes.

Arctic Temperature.—The temperature is mainly influenced by the winds and currents, and by the distribution of ice and land. Extensive land-masses will, on account of the radiation of heat, cause a very low winter-temperature, and also a comparatively low annual temperature ; this will be still more the case if the land is covered by a snow or ice sheet. An extensive sea will, even when it is covered by floating ice, cause a comparatively high annual temperature and reduced extremes both of summer and winter. On account of the peculiar distribution of land and water in the Arctic regions we can therefore understand that the lowest temperature is not to be sought near the geographical pole, but near the great land-masses. The lowest temperature ever observed on the Earth is —90° F. (—68° C.) in Verkhoyansk, in East Siberia, only some fifty miles north of the Arctic circle, whilst the lowest temperature observed during three winters in the Polar Basin as far north as between 85° and 86° N. was only —63° F. Instead of one pole of cold there are two, or rather three ; one in north-eastern Siberia (north of Yakutsk), one in the north of America (north of the Parry Islands), and a third in the interior of Greenland. The highest annual temperatures inside the Arctic regions are to be found along the north coast of Norway and the west coast of Spitsbergen, where the Gulf Stream, with much open and warm water, exercises a remarkable warming effect.

Arctic Flora.—The distribution of the vegetation in the Arctic region is greatly influenced by the temperature of the summer, the winter temperature is not of much importance. Thus the line of forest can be said nearly to follow the July isotherm of 50° F. Forests of pine trees or larch go farthest north in the north of Norway, and along the Siberian rivers, where on the Khatanga they reach the farthest point, nearly 73° N. North of

the line of forest, dwarf birches, willows, and other low shrubs grow, besides a quantity of Arctic flowers, grasses, mosses, and lichens. In Greenland there are no forest, or real trees, but in the south the dwarf birch, the juniper, the alder (*olnus*), and especially the willow may form small low woods, which in sheltered places may even reach the height of a man or more. In north Greenland only creeping dwarf willows are found. In Arctic America there is a somewhat similar distribution of bushes and shrubs. In Spitsbergen the only bushes found are rare dwarf birch and some dwarf willows. In Franz Josef Land there are no bushes or shrubs, the vegetation consists only of the most Arctic plants and flowers, including *Saxifraga oppositifolia*, *Draba alpina*, *Cochlearia fenestrata*, and the Arctic poppy (*Papaver nudicaule*).

Arctic Fauna.—The distribution of animals is perhaps less influenced by the climate. In the Arctic Seas there is an abundance of lower animal life on the bottom as well as at intermediate depths, even in very high latitudes, though it decidedly decreases with the latitude or perhaps rather with the distance from the open sea. Fishes are not very numerous far north, some species of *cottus*, a small species of codfish (*Gadus polaris*) and a few others are probably the most Arctic of all. The Polar shark (*Scymnus borealis*) also seems to go very far north into the ice-covered sea.

Birds do not occur in a large variety of species in the Arctic regions, but there is often a great abundance of individuals, and the bird-rocks or rookeries of Spitsbergen, Franz Josef Land, and Greenland, with thousands of guillemots, dovekies, little auks, kittiwakes, fulmars or mollymawks, and various species of Arctic gulls, form a very characteristic feature of Arctic scenery. In summer straggling birds may probably be found everywhere inside the Polar Basin.

Mammal life is found on most of the Arctic lands as well as in the sea. Of land mammals the polar bear and the polar fox are most widely distributed; they are found straggling over land and sea almost everywhere inside the Arctic circle. The reindeer has also a great circumpolar distribution; it occurs in all Arctic Europe, Siberia, Arctic America, Greenland (on the west coast and on the north-east coast), Spitsbergen, and Novaya Zemlya, but not in Franz Josef Land, though post-glacial reindeer antlers have been found there. The reindeer does not go so far north as the musk ox, which now, however, only occurs on the north-east coast and the north coast of Greenland and in Arctic America, though in earlier periods it had a quite circumpolar distribution. In the Arctic Seas there is more mammal life than in any other part of the ocean, and here we even find some of the largest animals which ever lived, the whales. The best known whale by name is the Greenland whale or the right whale, which is very valuable on account of its long whalebone. It was once abundant and had a wide distribution, but is now nearly extinct; it does not go far into the ice-covered seas. There are several other, but less valuable, large species of whales, besides a good many smaller ones. The most Arctic of all

whales is the narwhal or sea-unicorn, which goes far into the ice-covered sea, and occurs in the Polar Basin as far north as 85° N., and probably much further. The walrus is a circumpolar Arctic animal, but is now nearly extinct in a good many places, where quantities were killed in earlier times. Of seals there are several more or less Arctic species—the bladdernose (hood seal), the saddle back (harp seal), the bearded seal (*Phoca barbata*), and others. The most Arctic species is the ringed seal (*Phoca fœtida* or *hispida*), which straggles far north into the Polar Basin at least north of 85° N.

Arctic People.—The human race is distributed along the whole fringe of European, Asiatic, and American land inside the Arctic circle. There are a good many distinct tribes. In Arctic Norway the original Arctic people are the Lapps. In Arctic Russia and Siberia there are various tribes of Samoyeds, Zyryans, Tunguses, Yakuts, Chukches, and others. The greater part of the Arctic Siberian coast is not, however, inhabited. In Spitsbergen and Franz Josef Land there have never been any permanent habitations, but in Novaya Zemlya a few families of Samoyeds live. The most polar of all people are without doubt the Eskimo.

GREENLAND

Greenland is the largest and also in many respects the most interesting Arctic land. From 59° 45′ N. it extends over more than twenty-three degrees of latitude to north of 83° N., its northern termination being still unknown. The greatest breadth is in 77° 30′ N.—about 690 miles. Its area has been estimated to be 512,000 square miles. The whole interior of this land, or more than 320,000 square miles, is completely buried under an enormous glacier ice-sheet, or inland ice, which only leaves exposed a more or less narrow belt of barren, rocky ground along the shore, cut into by deep and narrow fjords, very much like those of Norway. The broadest exposed strip is 100 miles wide on the west coast, in the district of Holstenborg, 67° N., and 60 miles in the district of Godthaab, about 64½° N. Elsewhere it is quite narrow, and the margin of the inland-ice approaches the outer sea coast. The same is the case along most of the east coast, except in the northern part, between 70° N. and 74° N., where the margin of the true inland-ice appears to be situated in some place at a distance of about 130 miles or more inland from the sea; but the land outside is partly covered by local glaciers. The northern part of Greenland, north of 82° N., does not seem to be covered by the inland-ice or by glaciers.

Configuration and Glaciers.—Greenland is unusually mountainous. Wherever the coast is seen it is rocky and jagged, with high peaks and mountains and deep valleys and fjords. Along the whole of the east coast mountains between 5,000 and 8,000 feet are quite common, often not far from the sea. The highest peak known is Petermann Peak, near Franz Josef Fjord, which is estimated at 11,000 feet. On the west coast the

mountains are not so high, but even there peaks of 5,000 or 6,000 feet are not uncommon. We know nothing of mountains in the interior, as they are entirely covered by the inland ice, but if the ice-sheet were removed it is highly probable that the surface of the land would resemble that exposed near the coasts. The fjords were once filled with glaciers coming from the inland ice and discharging into the sea to throw off icebergs. Many of them are still partly filled with glaciers in this way, and most of them have glaciers discharging into them, and thus preventing us from tracing them in their whole length. Along the coast there are numerous islands, the largest known being Disco Island, in about 70° N. on the west coast. There is probably no other land of the same size which has such an enormous coast-line compared with its area. The largest fjords on the west coast are Umanak Fjord, North and South Ström Fjord (both about 90 miles long), and Godthaab Fjord. On the east coast, amongst others, Scoresby Fjord is about 160 miles long, and Franz Josef Fjord probably of similar length. These are longer than any in Norway, and are probably the largest typical fjords in the world.

There are still some parts of the Greenland coast which have not been explored, especially the north-east coast between Cape Bismarck and Independence Bay (81° 37′ N.), on the east coast, and between the latter and Cape Washington, on the north-west coast. The east coast, between 66° and 69° N., also still waits to be explored.

Geology.—The geological structure of Greenland is naturally little known, as we can only judge from the exposed rocks seen along the coast. According to these it is probable that by far the greater part of the rocky surface of the present Greenland consists of Archæan formations principally gneiss and other crystalline rocks. In the middle parts of the country, about latitude 70° to 73° N., there is a flow of basalt over great parts of the west coast at Disco Island, Nugsuak Peninsula, and Svartenhuk Peninsula, as well as of the east at Scoresby Sound and further north. These basalts, which probably are of Tertiary origin, cover considerable layers of the Tertiary and partly also the Cretaceous formations, which they have thus prevented from being destroyed; and on Disco and the Nugsuak Peninsula there are some of the most famous localities for Tertiary plant-fossils in the world. Jurassic strata are found in several places on the east coast (about 70° N. and 75° N.). They are perhaps of the same formation as in Franz Josef Land, Spitsbergen, Andö in Norway, and in Russia.

Greenland does not seem to have much mineral wealth. Cryolite is the only mineral mined, and is a speciality for Greenland. There is only one mine, at Ivigtut, on the south-west coast (in 61° 10′ N.). Native iron is found in several places, the most remarkable find is the iron of Ovifak (or Uifak), on Disco Island—several large masses, the largest of which is calculated at twenty tons. This iron is evidently of telluric

origin, and has originally been included in the basalts. In 1897 a still larger mass was brought back from Cape York, in North Greenland, which is estimated to weigh ninety tons, and is believed to be of meteoric origin.

The Inland Ice.—Instead of river systems we find in Greenland the great inland ice, and instead of great rivers we find the moving glaciers, the prolongations or outlets of the inland ice, slowly moving into the sea, and thus chiefly effecting the drainage of the country. The greater part of the precipitation in Greenland is not rain, but snow which, to a great extent, does not melt, but is accumulated on the surface of the inland ice, and by the pressure of its weight gradually becomes transformed into glacier ice. This, being a plastic or viscous mass, is pressed out to the sides by the pressure inside the ice mass, and it slowly flows outward, as a lump of pitch or wax which is placed on a table. The pace with which it moves is regulated by the pressure—the higher pressure or the greater mass added on the top the quicker is the motion. Thus the inland ice sends out glaciers through the valleys and into the fjords, the ice at the end of some glaciers being from 1,000 to 2,000 feet thick. The rate at which the glaciers advance into the sea differs much, and to a great extent depends on the extension and thickness of that part of the inland ice for which they form the "outlet" or "drainage." The highest rate of glacial motion ever known is that of the Upernivik Glacier, on the west coast, 73° N., which in summer advances 99 feet every twenty-four hours. The Jacobshavn Glacier, and other known glaciers, move about 50 to 60 feet daily in the summer time. In winter the motion is somewhat slower. The actual amount of ice discharged into the sea from Greenland may be estimated at 1,000,000,000 tons annually at least.

The drainage of Greenland is not, however, effected by this outflow of solid ice only. A great deal more is accomplished by running water. On the surface of the inland ice there is much melting going on during summer near its outer margins. The water thus produced finds its way as small brooks down through the enormous ice-sheet to the bottom, and runs as sub-glacial rivulets from under the glacier-covering into the sea. Where the ice-sheet is very thick, the temperature of the ice is probably near its melting point at the bottom, on account of the internal heat of the Earth. Some melting is therefore probably also going on from this cause, producing water which joins the sub-glacial rivers.

The inland ice covers the whole interior of Greenland, extending as a regular shield from coast to coast. Its surface forms a smooth snow-plain, arching high above the irregularities of the underlying ground, and sloping quite slowly and gradually from the highest ridge in the interior towards the coast on all sides. The highest ridge is in the southern part of the country, somewhat nearer the east coast than the west, and has, between 64° and 65° N., a height of 9,000 feet above the sea-level. How these

conditions are in the interior further north where the inland ice is broadest is still unknown. What the thickness of the ice-sheet is we cannot know so long as the heights of the mountains underneath are unknown, but as the bottom of the valleys are not probably on the average more than 2,000 —or let us say 3,000—feet above sea-level, the thickness of the ice must at any rate in some places be above 6,000 feet. A sufficiently cold climate is not the only condition necessary to produce an inland ice ; it also depends on the quantity of precipitation. The precipitation in the most northern part of Greenland does not seem to be sufficient for its formation, and therefore the land north of 82° N. is probably not covered by continuous ice.

People of Greenland.—The hardy Eskimo race extends along the whole Arctic coast of America and Labrador, along the coasts of the eastern islands of the American Arctic Archipelago, and along the coast of Greenland as far north as Smith Sound (about 78° or 79° N.). A small Eskimo tribe is also found on the Asiatic side of Bering Strait. The Eskimo live mainly by hunting and fishing on the sea, and are therefore bound to be a coast people. In the summer they go hunting and fishing in their small boats or kayaks, made of drift-wood covered with sealskin. In the winter they travel over the frozen sea in their sledges with dogs, which are their only domestic animals. They are a far and quick-travelling people, and traces are found of them over vast tracts of country where they do not live at present. In the summer they live in tents made of skins, in the winter they live in low stone huts, or, where stone is not available, they build snow-huts of a peculiar shape, resembling beehives. They are a gifted and hardy race, and with admirable skill they have known how to make their ingenious weapons out of pieces of driftwood, bones, skin, and stone, partly, also of native iron—the only means which a barren nature originally gave them : now they have of course got iron, as well as firearms from the Europeans, but these gifts have not been wholly to their advantage.

In Greenland there is altogether a population of about 10,000 Eskimo, and a few hundred Danes who administer the country. The Greenland Eskimo are, however, no longer a pure race, but are greatly mixed with European blood. The contact with European civilisation has there, as elsewhere, been of very doubtful advantage to the natives, who show a slow but certain decadence.

The Eskimo and half-breeds of southern Greenland are to some extent grouped around the Danish settlements, all trade with which is a Government monopoly of Denmark. Some of the principal administration and trading centres are *Julianehaab*, the most southerly (60° 40′ N.), *Godthaab*, and *Upernivik*, the most northerly, in 72° 48′ N. The Eskimo of Smith Sound, a small tribe, have no dealings with the Danish settlements. The principal settlement on the east coast is *Angmagsalik* in 65° 30′ N., where there are a few hundred Eskimo, and lately a Danish mission has been established.

ARCTIC ISLANDS

Franz Josef Land.—Franz Josef Land is a group of numerous comparatively small islands situated in about 80° to 82° N., and extending from longitude 42° E., eastward, probably beyond 62° E., but the eastern extension is still unknown. Land was reported further north and named Oscar Land and Petermann Land, but recent explorations seem to have proved that they do not exist. Some of the islands of Franz Josef Land are comparatively low and flat, but the highest are 2,000 to 3,000 feet above the sea-level, consisting of basalt,[1] partly resting on a thick formation of Jurassic clay. The islands are with few exceptions completely ice-capped, the ice-covering sloping regularly into the sea on all sides, allowing the basaltic rocks to project only here and there along the coasts. These islands therefore have a more glacial aspect than any other Arctic land; they are, however, much too small to form the base of any glaciers or ice-sheets of importance. Icebergs are formed in a good many places, but they are few and small compared with those of Greenland, and they do not travel far, for round Franz Josef Land the water is too shallow to float icebergs of any size

Spitsbergen.—Spitsbergen is a group of islands situated between 76° and 80½° N., and between 10° and 32° E. The principal islands are West Spitsbergen, which is the largest, North East Land, Barents Land, Edge Land (or Stans Foreland); on the west coast is Prince Charles Foreland, and to the east is Wiche Land (or King Karl's Land); to the south-east is Hope Island. Besides these there are many small islands, the most northern being the small Seven Islands (80° 48′ N.). To the east of North East Land land was seen in 1702, and called Gilles Land. It is perhaps this island which Norwegian walrus-hunters believe they have seen several times, and which they have called White Island or New Iceland. In the sea between Spitsbergen and Norway there is a small island called Bear Island.

The margin of Spitsbergen is a typical glaciated coast, much like that of Greenland and Norway. It is deeply cut and intersected by long and narrow fjords and sounds. Though comparatively small as the island of West Spitsbergen is, it has fjords of considerable length—Ice Fjord, on the west coast, is 60 miles long; Wiide Bay, on the north coast, is 50 miles long; Bell Sound, on the south-west coast, is 30 miles; Hinlopen Strait, between West Spitsbergen and North East Land, is a narrow channel, 100 miles long, with the character of a typical fjord.

Spitsbergen is a mountainous country with peaks and valleys, but the mountains do not rise to great heights, as a rule no more than 2,000 to 4,000 feet. The most important mountain-ranges with more alpine forms are

[1] Though basalts and lavas of comparatively recent geological origin (Tertiary and perhaps Jurassic) occur in many places in the Arctic regions, there is only one active volcano known north of the Arctic circle, viz., the little island Jan Mayen, east of Greenland in the Greenland Sea, with the Beeren Berg (7,000 feet).

situated near the west coast. Eastward the land is lower, and the mountain are generally more rounded. The highest peaks known in Spitsbergen are Horn Sunds Tinder, near South Cape (76° 55′ N.), about 5,000 feet.

The snow and ice seem in Spitsbergen to have a tendency to accumulate and cover the land more in the east part of the country than in the west—a condition similar to that in the south part of Greenland.

The interior of West Spitsbergen is not covered by a genuine inland ice, like that of Greenland, overflowing the whole area and drowning all the valleys and mountains. In various parts of the island, however, extensive local glaciers, or a glacier-covering, exist in the interior, which is not mighty enough to drown the main features in the orographical configuration of the underlying land. They resemble the great ice fields of Norway, and discharge glaciers down through the valleys into the ends of the fjords, where the ice breaks off, but the pieces are not large enough to be called icebergs.

The greater part of North East Land is covered by an ice-sheet, which may be called a small inland-ice. The height of its smooth, regularly curved surface, gradually sloping downwards towards the coasts, is more than 2,000 feet above the sea in its highest part. On the east and south coast this inland ice descends into the sea, whilst the west and north coast is not covered by ice.

Spitsbergen consists mostly of primitive rocks. Some districts, especially in the eastern part, are overflowed with basalt, probably of Jurassic or Tertiary origin, and perhaps similar to the great basalt flow of Franz Josef Land. In some parts of West Spitsbergen there are Tertiary formation with interesting plant fossils.

The mineral wealth does not seem to be of much importance, though in some places there are beds of tolerably good coal.

Novaya Zemlya.—Novaya Zemlya, which is divided into two large islands by the narrow sound, Matochkin Shar, is a quite Arctic land, and its whole character resembles that of Spitsbergen. The land is mountainous, and the coast is intersected by fjords, which are not very long. In the north there are extensive glaciers in the interior, probably similar to that of West Spitsbergen, and glaciers discharge into the ends of the fjords.

Arctic Siberia.—Arctic Siberia is to a great extent low and barren undulating plains, the tundra intervening between the northern forest limit and the desolate Polar shores, and intersected by great rivers. The most mountainous part of Arctic Siberia seems to be Taimyr Land, where there appear to be several, though not very high, mountain ranges. The north coast of Siberia, which is as a rule very low and flat, is not so much intersected by fjords or bays as the coasts of most Arctic lands. An exception is perhaps to be found in the little-known but somewhat mountainous coast between the mouth of the Yenisei and the Taimyr Bay, where there probably are fjords, and where there are a good many islands lying scattered in the shallow sea outside.

Arctic Siberia has no glacial covering, and here are not even any local

glaciers known. If such exist, almost the only place where they can be is the Chelyuskin Peninsula (the most northern point), and even there they must be very small. The reason of this is that the climate is too dry to allow of any yearly accumulation of snow. Along the northern coasts there are only patches of snow in the depressions and small valleys, which do not vanish in summer. One of the most interesting features of Arctic Siberia is that the soil is frozen for great depths below the surface, with intervening layers of real blue ice, called rock-ice or ground-ice. On the top of this rock-ice there may be a layer of soil, a foot thick or more, on which forests of larch and other trees grow. Frozen remains of the mammoths and other animals, which have lived there probably later than the Ice Age, are found, and in some cases the frozen corpses of mammoths still retain their flesh, skin, and hair.

New Siberian Islands.—The New Siberian Islands, north of the Siberian coast, are surrounded by a very shallow sea, and are comparatively low with rounded forms. They contain Silurian and Tertiary formation, the latter with a highly interesting fossil flora (the "wood-hills" of New Siberia). On some of them, especially the southern one, Great Liakhoff Island, there are important finds of mammoth remains and valuable mammoth tusks. To the north of these islands are Sannikoff Land and Bennett Land; the size of these is unknown, but they are probably not very large.

Arctic America.—Arctic North America is in character much like Arctic Siberia, but is somewhat more mountainous. North of the continent the numerous islands of the Arctic Archipelago are comparatively low, and have generally more or less rounded mountain forms. There is nowhere sufficient precipitation to form an inland ice, though on some of them, especially in the east, there are great local glaciers, *e.g.*, Baffin Land, North Devon, Ellesmere Land, and Grinnell Land. The last named, the northern part of which is also called Grant Land, is, besides Greenland, the most northern land visited by man. It rises to elevations of 2,000 and 3,000 feet. In this land (in Lady Franklin Bay, 81° 45′ N.) is found the most northern deposit of coal, with a fossil Tertiary flora, including thirty species of plants, pines, birch, poplar, elm, and hazel.

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CHAPTER LV.—THE ANTARCTIC REGIONS

By Sir John Murray, K.C.B., F.R.S.,
Director of the Reports of the "Challenger" Expedition.

The Antarctic.—The term Antarctic is applied to that region of the Earth's surface surrounding the South Pole. The Antarctic Ocean is, strictly speaking, bounded to the north by the Antarctic circle, but the term is usually applied to the great circumpolar ocean which is affected by floating pack ice. The whole of the Southern Ocean may, indeed, be at times affected with ice, Antarctic icebergs being frequently encountered north of lat. 45° S. in the southern parts of the Pacific, Atlantic, and Indian Oceans.

FIG. 487.—*The Antarctic Regions and Southern Ocean.*

History of Exploration.—After the torrid or fiery zone of the ancients was crossed towards the end of the fifteenth century, the vague conception of a vast continent towards the South Pole was widespread among geographers and explorers, and New Guinea and parts of the land about Magellan Strait were believed to be portions of it. With the progress of exploration the outlines of this southern continent became more and more circumscribed. Tasman, in 1642, showed that Australia and Tasmania were surrounded by water to the south, but New Zealand, which he visited, was believed to be part of the Austral continent, even up to the time of Cook's first voyage, when New Zealand was proved to be an island. In 1772 Kerguelen went to explore the land reported to the south of the Cape of Good Hope, and sighted Kerguelen Island, which he supposed to be a part of the great southern land.

At last, in 1772, Cook was dispatched on his second voyage with the express object of finally settling the question of the existence of the reported southern continent, and he proved that if it existed it did not

extend beyond the Antarctic circle. Cook pushed as far south as lat. 71° 10 S. in long. 107° W., while two later explorers attained even higher southern latitudes, viz., Weddell, who in 1823 penetrated as far as lat. 74° 15′ S. southwards of South Georgia, and Sir James Clark Ross, who in 1842 reached lat. 78° 10′ S., discovering Victoria Land, and landing upon Possession and Franklin Islands. Of other explorers we may mention: Smith (1819), Bellingshausen (1820), Powell (1821), Morrell (1823), Biscoe (1830), Kemp (1834), Balleny (1839), D'Urville (1839–40), Wilkes (1839–40), and Moore (1845). More recently Dallman, in 1873–4, visited the neighbourhood of Graham Land; in 1874 the *Challenger* Expedition penetrated beyond the Antarctic circle on the voyage from the Cape of Good Hope to Australia. Between 1893 and 1895 whalers from Scotland and Norway visited the Antarctic regions, landings being effected on Seymour Island by Larsen, and on Victoria Land at Cape Adare by Kristensen. The *Belgica*, under Gerlache, explored Hughes Bay in the Antarctic summer of 1898–99, penetrated the ice-pack and reached 71° 36′ S. in 87½° W. The ship remained fast in drifting ice for a whole year, and her crew were the first to winter south of the Antarctic circle. The German Deep-Sea Expedition, under Chun, visited the Antarctic seas in 1898, reaching 64° 14′ S. north of Enderby Land. A British expedition in the *Southern Cross* was sent out in 1898 by Sir George Newnes, under Borchgrevink, who wintered at Cape Adare in 1899, and in 1900 succeeded in reaching 78° 50′ S., to the east of Mount Erebus. On January 1, 1903, Captain R. F. Scott, sledging southward from the *Discovery*, which had wintered in Macmurdo Strait, carried the British flag to 82° 17′ S, the highest south latitude yet attained. His expedition sailed for the Antarctic regions in 1901, simultaneously with a German expedition on the *Gauss* under Dr. E. von Drygalski, which entered the ice south of Kerguelen. A Swedish expedition, under Dr. Otto Nordenskiold, spent the years 1902–3 south of the Falkland Islands; and the *Scotia*, under the command of Mr. W. S. Bruce, explored Weddell Sea in 1903, and discovered a snowy coast named Coats Land. Mr. Shackleton in the *Nimrod* resumed exploration in 1907.

Antarctic Land.—Looking upon the land sighted or explored at various points (Victoria Land, Wilkes Land, Kemp Land, Enderby Land, Graham Land, and Alexander I. Land), as forming part of one and the same land-mass, it has been estimated that the Antarctic continent (Antarctica) has an area greater than that of Australia, or nearly four million square miles. The form and structure of the Antarctic icebergs show that they have been formed on large land-surfaces, and the rock fragments and *débris*, scattered over the floor of the Southern Ocean as these icebergs melt while floating towards the north, belong to lithological types characteristic of continental land, including gneiss, granite, mica-schist, quartziferous diorite, grained quartzite, sandstone, limestone, and shale. D'Urville descibes rocky islets off Adélie Land composed of granite and gneiss; Wilkes found on an iceberg near the same place boulders of red sandstone

and basalt; Chun dredged up a mass of red sandstone weighing 5 cwt. north of Enderby Land. Borchgrevink and Bull brought home fragments of mica-schist and other continental rocks from Cape Adare in 1895; Donald brought back from Joinville Island pieces of red jasper or chert; while Larsen brought from Seymour Island pieces of fossil coniferous wood and fossil Molluscan shells closely resembling species from the lower Tertiary of Britain and Patagonia. All these geological finds indicate continental land. The ranges of mountains and peaks discovered by Ross in Victoria Land appear to be formed of ancient crystalline rocks, with volcanic cones towards the south, 7,000 to 15,000 feet in height, Mount Erebus (160 miles to the west of which Ross believed the south magnetic pole to be situated) being in active eruption at the time of his visit; Larsen visited one of several active volcanoes to the south of Cape Horn.

Antarctic Ice.—The icebergs of the Antarctic differ entirely from those of the Arctic regions. When observed near their origin, they are found to be huge, flat-topped, perpendicular-sided, floating ice-islands, sometimes many miles in length, having a thickness of from 1,200 to 1,500 feet, of which about one-sixth or one-seventh projects above the level of the sea, the great mass of the berg being below sea-level. They have frequently a stratified or laminated structure, and have undoubtedly been broken off and floated away from a great ice-barrier or ice-wall, like that along which Ross sailed for 300 miles about lat. 78° S. This ice-barrier is evidently the sea-face of an enormous glacier or ice-cap creeping slowly over the low-lying lands of the Antarctic continent towards the sea. When this ice-cap is pushed into depths of 200 or 300 fathoms portions are broken off and form the table-shaped icebergs, which on being floated to the north and becoming disintegrated may assume various shapes. Where the coasts of the Antarctic continent are occupied by high mountain ranges, as for instance, off the east coast of Victoria Land, the seaward face of the pack-ice is only 10 to 20 feet high, and at Cape Adare a landing was effected on a pebbly beach, occupied by a penguin rookery, where no land-ice descended to the sea. There have been many speculations about the thickness of the ice over the Antarctic continent towards the South Pole, Croll believing that it might be as much as 12 to 24 miles. It is, however, extremely improbable that ice of this thickness exists.

Atmospheric Pressure and Temperature.—Our knowledge of the atmospheric conditions in the Antarctic is very meagre, being derived from few observations mainly during the southern summer, but these seem to indicate that there is a girdle of low atmospheric pressure, south of the 45th parallel of south latitude, and outside of the ice-bound region, with a mean pressure of less than 29 inches, accompanied by strong westerly and north-westerly winds and large rainfall. The extreme south polar area appears to be occupied by a vast permanent anticyclone, much more extensive in winter than in summer, out of which south-easterly winds blow from the pole towards the girdle of low pressure. Ross's

barometric observations indicate a gradual rise in the pressure south of lat. 75° S. As regards the temperature of the air, it is evidently, even in summer, extremely low, the mean of all the observations taken by Ross to the south of lat. 63° S. being 28.7° F., and his maximum 43.5° F. The winter minimum reported at Cape Adare or by the *Belgica* in 71° 30′ S. was —45° F., but the *Discovery* found —62°. The atmosphere is apparently dry over the ice-covered land, the moisture separating in the form of small snow-crystals, while farther north the air is often near the point of saturation, and more moisture is precipitated.

The Antarctic Ocean.—The temperature of the surface waters of the Antarctic Ocean appears to be higher in summer than that of the air. Thus Ross's observations south of lat. 63° S. give a mean daily temperature of 29.8° F. (compared with 28.7° F. for the air), varying from 27.3° to 33.6° F. Below the surface of the sea the *Challenger* observations show that in summer there is a wedge-shaped stratum of cold water sandwiched between warmer water at the surface and at the bottom. This stratum was traced from 65° to 53° S., and had a temperature at the southern thick end of the wedge of 28° F., and at the northern thin end of 32.5°, while that of the overlying water varied from 29° F. in the south to 38° F. in the north, and that of the underlying water from 32° to 35° F. In fact the whole of the water in the greater depths of the Antarctic Ocean has a temperature of 32° to 35° F., being pretty much the same as the temperature of the deepest bottom water throughout the great ocean basins, even in the tropics. The *Valdivia* found in 64° S. a mass of comparatively warm water of high salinity sandwiched between colder layers of deep and superficial water. The annual range of temperature in the waters within the pack-ice area never appears to exceed 10° F.

The available data for the depth of the Southern and Antarctic Oceans indicate a gradual shoaling from deep water towards the Antarctic continent, although between the latitudes of the Cape of Good Hope and of Kerguelen depths ranging from 2,500 to 3,100 fathoms were found by the *Valdivia* between 55° and 64° S. To the south-east of South Georgia, Bruce showed that Ross's sounding of 4,000 fathoms was erroneous; but south of Australia the *Challenger* found depths of 2,600 and 1,950 fathoms, and nearer the Antarctic circle depths of 1,800, 1,300, and 1,260 fathoms; Wilkes sounded in 500 and 800 fathoms off Adélie Land; Ross had soundings of 100 to 500 fathoms off Victoria Land; and depths of 164 to 480 fathoms have been recorded east of Joinville Island. The *Belgica* found depths under 200 fathoms in the pack west of Palmer Land.

Our knowledge of the Antarctic marine deposits is derived from the *Challenger* soundings, the observations of Hooker with Ross's expedition, and the soundings of the *Valdivia*. The deposit in the far south, surrounding the Antarctic continent, is Blue Mud, containing glauconite, composed mostly of land-detritus, mixed with remains of pelagic and bottom-living organisms. To the north of this Blue Mud, there is apparently a con-

tinuous circumpolar band of Diatom Ooze, made up principally of the frustules of diatoms which lived in the surface waters, along with pelagic shells and some land-débris dropped by floating icebergs. This Diatom Ooze when dried is usually pure white or cream coloured, and looks not unlike chalk. Northwards of the Diatom Ooze the deposit is Globigerina Ooze, consisting mostly of the shells of pelagic Foraminifera, passing in very deep water into the characteristic deep-sea deposit Red Clay, associated with manganese nodules, sharks' teeth, and ear-bones of whales.

Marine Fauna and Flora.—Marine life, in the surface, intermediate and bottom waters of the south Polar sea, is very prolific. Pelagic Algæ, especially Diatoms, abound in the upper layers to the depth of 50 fathoms, forming an abundant food supply for the pelagic animals, such as Copepods, Amphipods, and Molluscs, &c., and for the animals living at the bottom. Pelagic calcareous organisms, like the Pteropods and Foraminifera, which are so numerous, both in species and individuals, in the surface waters of the tropics, become less and less abundant towards the Polar seas.

Of the shallow-water bottom-living (benthonic) fauna of the Antarctic, we have information only in the case of the more northerly islands, like Kerguelen, Bouvet, and South Georgia, but the available observations seem to indicate that in the shallow waters around Antarctic lands, in depths less than 25 fathoms, life is not so abundant as in depths of 100 fathoms and more. The deep-sea fauna of the Antarctic region has been shown by the *Challenger* to be exceptionally rich, a much larger number of species having been obtained than in any other region visited by that expedition, and the *Valdivia's* dredgings in 1898 confirm this. In the cold waters of the Antarctic there is a very feeble development of shells and other calcareous structures in marine organisms when compared with what obtains in tropical waters. As with the pelagic organisms, so in the case of the benthonic fauna, a great many species and genera are recorded from the colder waters towards both the north and south Polar seas which are unknown in the intervening tropical area. The pelagic larvæ of benthonic animals are almost unknown in Polar waters, where most of the bottom-living species appear to have a direct development; this has been directly observed in several species of Echinoderms and Crustaceans in the cold waters of both hemispheres.

Antarctic Mammals and Birds.—There are many whales in the great Southern and Antarctic oceans, some of which appear to be closely allied to if not identical with those in the Arctic seas. The right whale (*Balæna mysticetus*) is not found in the south, but a small whalebone whale which has been described under the names *B. australis* and *B. novæ-zealandiæ* seems to be identical with *Balæna biscayensis* of the northern hemisphere. The humpback and rorqual whales appear to be identical with those in northern seas, and the same may be said of the grampuses, pilot whales, ziphioid whales, and dolphins. Thirteen species of seals are known from the Antarctic. Of these *Macrorhinus leoninus* is supposed by

some naturalists to be identical with the *Macrorhinus* from the coasts of California. The sea lion (*Otaria jubata*) is widespread in the Antarctic, but is now much less abundant than formerly. The fur seals belong to the same genera as the North Pacific species. The penguins are the most characteristic birds of the Antarctic, and some species exist in prodigious numbers—their rookeries being found on nearly all the islands and points of land free from land ice. The discovery of a penguin rookery at Cape Adare is most important for the future of Antarctic exploration, for it shows that there is open water every year, and an abundant supply of food and fuel. The peculiar sheath-bill (*Chionis*) is usually found in all penguin rookeries. The albatrosses and other Procellaridæ are most abundant and breed in almost all the Antarctic Islands, together with terns, skuas, and gulls. The southern skua (*Stercorarius antarcticus*) appears to be identical with the Arctic species. On Kerguelen a small teal (*Querquedula eatoni*) is most abundant. Fishes have nowhere been observed in abundance in the waters of the Antarctic, although fish remains are most frequent in the stomachs of penguins and seals. The naturalists of the *Belgica* and of the *Southern Cross* collected a few insects as well as mosses or lichens in the most southerly lands. It is unlikely that any land mammals exist on the Antarctic continent.

What Remains to be Done.—From a geographical point of view much remains to be done in defining the topography of the land and the sea-floor within the Antarctic circle. This is by far the largest absolutely unknown area now remaining on the Earth. Our knowledge of the physical and biological conditions of high southern latitudes is most fragmentary, and it is satisfactory to know that the exploration of this great unknown region is now being seriously undertaken by civilised and progressive nations. It cannot be doubted that a successful exploration of the Antarctic would make a great advance in the philosophy of terrestrial science.

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INDEX

AACHEN (Aix-la-Chapelle), 282, 288
Aalborg, 210
Aar, river, 258
Aarau, 264
Aargau, 264
Aarhuus, 210
Ab-i-Panja river, 465
Ababdeh tribe, 926
Abaca, 803
Abagaza, people, 1001
Abancay, 839
Abazwang indaba, people, 1001
Abbaya, lake, 931
Abbazia, 315
Abdesh-Shems, 453
Abeokuta, 968
Aberdeen, 157; fisheries, 149
Åbo, 412
Aborigines of Brazil, 868; Central America, 787; Dutch New Guinea, 644; North America, 676; New South Wales, 596; Porto Rico, 800; Queensland, 590; South America, 822; South Australia, 616; Tasmania, 612; Victoria, 604; W. Australia, 623
Abruzzi, 364; Appennines of, 356
Abruzzi, Duke of, in Arctic, 1032
Abyla, 378
Abysmal Area, 46, 91
Abyssinia, 934, 935
Acadia, 687
Acajutla, 788
Acampsis river, 440
Acapulco, 781
Acarai mountains, 879
Acatenango, Mount, 783
Acclimatisation, 98
Accra, 964
Accrington, 173
Achaia, 349
Achill Island, 187
Achin, *see* Atjeh
Aconcagua mountain, 816, 850
Açores Archipelago, 384
Acroá, people, 869
Adalia (Attalia), 444; Bay of, 439
Adam, Mount, 863
Adam's Bridge, 504; Peak, 504
Addis Halem 935
Adana, 443
Adamawa, 971
Adare, Cape, 1049
Adelaide, 619; Climate, 615; Foundation of, 585; river, 615
Adélie Land, 1050
Adelsberg, 303
Aden 454; harbour, map, 455
Adenara islet, 572
Adige river, 303, 304, 306, 355
Adirondack mountains, 668, 671, 727, 734
Adjacent Isles of the Philippines, 559; of Portugal, 384
Adjustment of rivers to land, 59
Adowa, 935
Adrar, 953
Adrianople, 343; basin, 332
Adula, 259
Adur, river, 180
Ægadian islands, 353
Ægina, gulf, 348
Ætolia, 348
Afghanistan, 464–468
Aflaj district, 456
Africa, Configuration, map, 890; Continent of, 889–903; Population of, 103; Vegetation map of, 895
Afridi people, 467
Afrikander people, 990
Agassiz, Lake, 695, 743, 750,
Agaûa, 656
Agave, in Bahama, 803; in Central America, 786
Aggraded = filled up, 672
Agni, people, 956
Agoe, 957
Agra, 489
Agram, 323
Agri, River, 357
Aguadilla, 800
Agulhas, Bay, 982; Bank, Currents on, 70; Fisheries on, 989
Ahmedabad, 492
Aidin (Tralles), 443
Ailao, 517
Aimoré people, 869
Ainiak people, 467
Ain Safra, 906; Shehat, 916; Smara, 908
Aintab, 451
Ainu people, 108, 549
Air, Action of ocean on, 71; Temperature of, 72
Aire valley, 170
Airolo, 265
Aïtoff, D., Russian Empire, 386–421
Aix, 253
Aix-la-Chapelle, 288
Ajau people, 945
Ajudhia, 489
Ak-Hissar (Thyateira), 443
Akabah, gulf, 452, 629
Akaroa, 628
Akassa, 968
Akhtuba river, 390
Aki, 553
Akkerman, 409
Akoa people, 959
Akorodu, 968
Aksu river, 397
Aksum, 935
Akureyri, 213
Akwa people, 967
Akyab, 496
Alabama, 745; Coastal Plain, Map, 746; river, 746
Alagoas, 875
Alagœz Mountain, 395
Alai Mountains, 396
Ålands islands, 197
Alaotra lake, 1016
Alashehr (Philadelphia), 443
Alaska, 667, 677, 770; Acquisition of, 711
Ala-tagh mountains, 396
Alatau mountains, 398
Alausi basin, 831
Albania, 343
Albanians, 334
Albany, N.Y., 729, 731, 736; Western Australia, 625
Alba Realis, 322
Albemarle Island, 658
Albert-Edward, Mount, 635; Nyanza, 931
Albert Nyanza, 931; Discovery of, 901
Alberta, 701, 702
Albury, New South Wales, 600
Alcacer do Sal, 381
Aldan, river, 400, 426
Alderney, 186
Alemtejo, 380
Alençon, 251
Aleppo, 449, 451
Aleutian islands, 667, 770
Alexander, Archipelago, 770
Alexander the Great, 8; in Afghanistan, 467; in Asia Minor, 441; in Egypt, 924; in India, 480
Alexandretta, 451
Alexandria, 927
Alexandrina Lake, 614
Alexandropol, 409
Alexandrovo, 418
Alexandrovsk, 407, 412
Alfa fibre, 909
Alfurs, 644
Algarve, 382
Algeria, 900, 906–913
Algiers, 911; department, 907; Temperature and Rainfall, 908
Algoa Bay, 985
Algonkian (Algonquian) tribe, 106, 683
Alicante, 377
Alice Springs, Climate, 615; Temperature and Rainfall, 581
Aliwal North, 991
Allahabad, 488
Allan valley, 157
Allegheny Mountains, 670, 671; Structure of, 40; Plateau, 671, 721, 727, 731, 732; river, 734
Allemanni, 260
Allen, Lough, 189
Aller river, 271
Alligator river, 615
Alluvial fan, 57; plain, 56
Alluvium, 56; Geological position of, 51
Almaden, 374
Almeria, 377
Along bay, 519
Alpaca, 821; in Peru, 837
Alpine Foreland, 284; of Germany, 267; of Austria, 304
Alpine Provinces of Austria, 302
Alps, 125, 256, 353; Divisions of, 126; Eastern, 299; Geological divisions of, 129; Glaciers of, 126; of Germany, 267; Italian, 354; Passes of, 126; Map of Chief Passes, 127; Relative extent of, 396; Section across, 257; Western, 237
Alsace, 241
Alsace-Lorraine, 287
Altai mountains, 398
Altenburg, 290
Altitude, definition, 15
Alto Peru, 840
Altona, 295

Altos, 788
Altvater mountain, 292, 309
Altyn Tagh mountains, 539
Aluta river, 327
Alvarado in Central America, 787
Amacura river, 878
Amadeus, Lake, 615
Amager island, 210
Amalfi, 359, 361, 365
Amanus, Mons, 448
Amapala, 788
Amatique bay, 783
Amazon basin, 865; river, 816, 873; valley, 868
Amazonas, Peru, 839; Brazil, 873
Amazonian, Region of Peru, 835; Slope of Ecuador, 831; States of Brazil, 873
Ambaca, 984
Ambala, 490
Ambalema, 828
Ambato, 833
Amberno river, 642, 643
Amboyna island, 571
Ambriz, 984
Ambrym island, 647
America, Name of, 11; North and South contrasts, 664; Structure of, 40
American or Red Race, Classification of, 102, 106
Amiens, 249
Amida, 448
Amisus, 443
Ammeberg, 203
Ammer, lake, 272
Amoy, 535
Ampanam, 572
Amraoti, 493
Amritsar, 490
Amsterdam, 222
Amsterdam islet, 1024
Amu-daria river (Oxus), 396, 397
Amur river, 399, 400, 539
Anaa island, 657
Anahuac plain, 776
Anamalai hills, 494
Anatolia, 439–445; railway map, 443
Ancachs, 837
Ancohuma, Mount, 817
Ancona, 364
Ancyra, 443, 444
Andahuaylas, 839
Andai, 643
Andalusia, 374, 376
Andalusian mountains, 369, 370
Andaman islands, 499
Andean, Basins of Ecuador, map, 830; Countries, 824–848; Provinces of Argentina, 855; Region of Peru, 834
Anderlecht, 228
Andermatt, 263
Andes, mountains, 816; of Argentina, 850; of Bolivia, 840; of Chile, 843; of Colombia, 824; of Ecuador, 829; of Peru, 834
Andorra, 377; la Vieja, 378
Andree, explorer, 1032
Androscoggin river, 725
Anegada, 807
Aneto, 371
Angara, river, 400, 426
Angers, 251
Angkor-wat, ruins, 518
Angles, people, 144
Anglesea, 164
Anglo-Parisian Basin, 235
Angmagsalik, 1043
Angola, 982–984
Angolare people, 981
Angoni people, 949, 1001
Angora (Ancyra), 443, 444
Angora goat, 441
Angoulême, 245
Angra, Pequena, 1012; de São João, 981; do Heroismo, 384
Anguilla Island, 808
Anian, Strait of, 1026
Animals and Plants, distribution of, 82; Pelagic, 90; *See also* Fauna *and* Flora
Animals, Land, groups of, 90
Ankaratra, 1016
Ankobra river, 963
Ankole, 938
Ann, Cape, 722
Anna de Chaves, 981
Annam, 516
Annamite people, 517
Annan river, 160
Annapolis, Md., 731; Valley, 686
Annatom island, 647
Annobon, 953
Anping, 554
Ansariyeh mountains, 449; people, 450
Ansitan, 539
Ansoes, 644
Ansongo rapids, 956
Antananarivo (Tananarive), 1019
Antarctic, Land, 1048; Ocean, 1047, 1050; Ocean, Position of, 61; Regions, 1047–1052; map, 1047
Antarctica, 1048
Antecedent rivers, 732
Anthracite in Pennsylvania, 727; in South Wales, 150
Anthropogeographical relations, 99
Anthropogeography, definition, 5
Anti- Balkan Mountains, 331; Lebanon Mountains, 449; Taurus Mountains, 439
Anticline, definition, 53
Anticosti Island, 689
Antigua (Guatemala), 783, 789; Island, 807
Antillean mountain system, 667
Antioch, 451
Antioquia, 827; mountain, 825
Antipodes Island, 627
Antis people, 822
Antisana, mountain, 830
Antivari, 337
Antofagasta, 846
Antonia Peak, 979
Antrim, Co., 189, 193
Antumey (Annatom) Island, 647
Antwerp (Anvers), 229
Anyanja people, 949
Anzin, 249
Aomori, 551
Aorangi, mountain, 628
Aosta, 126
Apache tribe, 779
Apamea, 443
Aphelion, 72
Apia, 654
Apian "Cosmographia," 2; Maps of, 31
Apollonia (Valona), 344
Appalachian, Belt, 715; Mountains, 670, 681; Northern continuation of, 690
Appennine Foreland, 357
Appennines, 125, 352, 355
Appenzell, canton, 263
Apple Tree (Yablonovyi) Mountains, 398
Apsheron, 394
Apulia, 364; (Le Murgie), 358
Apulum, 323
Apure river, 885
Apurimac, 839; river, 835
Aquitaine, 236
Arab Geographers of Middle Ages, 10
Arab Zone province, 978
Arabah depression, 449
Arabia, 451–456; Petræa, 453
Arabian region, 433
Arabs, 437, 453, 898, 910, 914, 917, 926, 937, 939, 956, 978
Arad, 322
Arafura Sea, 577
Araguaya river, 874
Aragon, 373, 377; river, 370
Arakan, 472, 496
Aral, Lake, 396, 425
Aralo-Caspian basin, 395
Aram-Naharaim, 447
Arapey river, 857
Ararat mountain, 395, 440
Ararat, Victoria, 609
Aras river, 457
Araucanian people, 822, 845
Arawak people, 800
Arawary river, 883
Araxes river, 395
Arcadia, 349
Archæan rocks, Geological position of, 51
Archangel, 411
Archipelago Vilayet, 444
Arco, 306
Arctic, America, 1046; Archipelago, 703, 1027, 1046; Record, 1025–1033; Regions, 1033–1046; Regions, map, 1034; Sea, 41, 62, 1033; Siberia, 1045
Arctogæic Realm, 88
Arden, Forest of, 174
Ardennes, 224, 237
Arecibo, 800
Ared district, 456
Arequipa, 838
Arfak mountains, 643
Argaeus, Mount, 439
Argau, 264
Argentina, 849
Argentine Republic, 849–856
Argos, 349
Argovia, 264
Arguin, 953
Argun river, 400
Arguni bay, 642
Argyll, 156
Arhuaco people, 827
Arid, climates, 80; regions and river work, 57
Aristotle, 8
Arizona, 765
Arkansas Highlands, 753
Arkhangelsk (Archangel), 411
Arklow, 189
Arlberg tunnel, 262, 306
Armenian nation, 436; plateau 395, 427
Armenians, 403, 442
Armidale, N.S.W., 600
Armorican region, 235
Arnawi, 466

Arnhem, 222
Arnhem Land, 576, 578
Arno river, 356
Aroa, 887
Aron, 968
Arrowsmith, 31
Arroyo, 800
Arta gulf, 346
Artesian wells in Atlantic States, 721; in Queensland, 591; in Sahara, 908; in S. Australia, 618
Aruba island, 806
Arun, river, 180
Arundel, 180
Aruwimi province, 978
Arya tribes, 478
Aryan languages, 132
Arzeu, 911
Asaba, 972
Asama-yama volcano, 546
Ascension island, 1013
Ashango people, 959
Ashanti, 964
Ashford, 180
Ashio, 548
Asia, Continent, 422–438; Mountain systems, map, 427; Minor, plateau, 425; Minor, *see* Anatolia
Asiatic Turkey and Arabia, 439–456
Askhabad, 417
Askja, volcano, 213
Asosan, volcano, 546
Asphalt in Trinidad, 811
Aspromonte, 357
Ass, Wild, 540
Assab, 935
Assam, 473, 495; Forests, 477
Assiniboia, 702; District, 701
Assinie, 957
Assiut, 927
Assuan, 922, 927
Assyria, 450
Assyrian Empire, 447
Astorga, 376
Astrakhan, 414
Astrolabe bay, 639
Asturias, 371, 376
Asuncion, 862
Atacama desert, 821
Atbara river, 920
Atel, 414
Athabasca, district, 702; Lake, 681; river, 681, 698, 703
Athapascan people, 106
Athens, 348
Atjeh, 565, 566
Atjinese people, 557
Atlantic, City, 718; Coastal Plain, 718; Coastal Plain (map), 720
Atlantic Ocean, currents of, 69; configuration of bed, 60; origin of, 36, 41; position of, 61; Salinity of, 64; Shore Line of United States, 717
Atlas mountains, 41, 370, 890, 904, 907
Atmosphere, 3, 4; and climate, 72–82; Effects of heat on, 74; Pressure of, 76
Atoll, 62; Map of typical, 657
Atolls in Pacific, 649
Atrato river, 824, 828
Atrek river, 457
Attalia, 444
Attica, 347
Attie, 957
Attopeu, 517
Atures rapids, 884
Auburn, Me., 725; N.Y., 736
Auckland, 634; Islands, 627
Augila, 916
Augsburg, 284
Augusta, Mè., 723
Aulad 'Aly Bedawin, 926
Aullagas, lake, 840
Aurangabad, 498
Aurès range, 907
Aussig, 308
Austin, Tex., 755
Austral plant division, 88
Australia, Continent of, 575–586; Fauna of, 87; Felix, 605; Felix, extinct Volcanoes of, 579
Australian, Alps, 594, 602; Cordillera, 588; people, 104; region, 87
Austria, 302–315; statistics, 325
Austria-Hungary, 298-301; Origin of, 136; Provinces of, 301
Austrian, Alps, 302; Gap, 303
Austro-Hungarian Monarchy, 298-326
Auvergne, 239
Aux Cayes, 802
Avalon Peninsula, 705
Avars, 319
Avenches (Aventicum), 264
Aventicum, 264
Avignon, 253
Avila, 376
Avon river, 166, 174, 176, 179
Awas mountains, 1012
Awe, Loch, 156
Awob river, 1012
Ax, 377
Axarfjord, 213
Axim, 964
Axis (Espigão) mountain of Brazil, 866
Ayacucho, 839
Aylesbury, Vale of, 179
Aymara people, 822, 841
Ayolas, Juan de, in Paraguay, 862
Azimuth, definition, 15
Azoques, 833
Azores, *see* Açores, 384
Azov sea, 407
Aztecs, 779
Aztlan, 779
Azuay province, 833
Azure Coast, 253

BA- CANCALE People, 983; Coroca people, 983; Cuisso people, 983; Ronga, 996
Bâb el-Mandeb strait, 425, 452
Baba, Cape, 422
Babylonia, 447
Back, Sir George, Arctic Voyage, 1028
Backbone (Epinhaço) of Brazil, 866
Bactria, 467
Bad Lands of Dakota, 758
Badagry, 968
Badajoz, 376
Badakhshan, 397, 465
Baden, Grand Duchy, 286; near Vienna, 306
Baer, Von, 56
Bafulabe, 958
Baffin, Arctic Voyage, 1026; Bay, 1035; Land, 1046
Baggara tribe, 926
Baghdad, 448
Bagnères-de-Luchon, 252
Bagrada river, 914
Bahama islands, 667, 803; climate, 792
Baharieh oasis, 928
Bahia, 870, 875; Blanca, 849; dos Tigres (Great Fish Bay), 982; Honda, 798
Bahr-el-Abiad, 920; Azrak, 920; Gebel, 920; Ghazal, 920
Bahrein islands, 452
Baikal lake, 400, 401, 426
Bailundo regions, 982
Baillie, Alexander F., Paraguay, 859; Uruguay, 856
Baines, J. A., India, 469
Baixas do Sorraia, 380
Bajan people, 567
Bakalahari people, 1002
Bakel, 956
Baker, Sir Samuel, explorer, 901
Baku, 416
Bala lake, 165
Balabac island, 559; strait, 566
Balata in Dutch Guiana, 882
Balaton-Füred, 318
Balaton (Platten) lake, 318
Bald Mountain, 688; (Lysa Gora), 392
Bâle, canton, 264
Balearic islands, 370, 377
Bali island, 564
Balkh (Bactria), 467
Balkan mountains, 331, 338; Peninsula, 330–335; Peninsula, reorganisation of, 136
Balkhash, lake, 396
Ballarat, 608
Balleny in Antarctic, 1048
Balsam lake, 694
Baltic Sea, 407; Circulation of, 67
Baltimore, Md., site, 720; as a seaport, 715
Baltistan, 499
Baluchistan, 499
Balumbo people, 950
Bambara people, 956
Bamberg, 285
Bamboo in Africa, 896; in China, 526; in Colombia, 826; in India, 477
Bammako, 958; rapids, 956
Bamopamo river, 962
Banana, 978
Bananas in Jamaica, 804
Banda islands, 571
Banda-neira island, 571
Bandana river, 957
Bandar Abbas, 463; Maharani, 515
Bandjermassin, 568
Banff County, 156
Bang Pa Kong river, 508
Bangala people, 983; province, 978
Bangalore, 498
Bangaso, 959
Bangkok, 510
Bangor, Me., 723
Bangui, 959
Bangweolo, lake, 947
Bani-Bagoe river, 957
Banka island, 565, 566
Banks Peninsula, 628
Bann, river, 193
Bantam, 562, 563
Bantu in East Africa, 933; people, 898; speech, 104; in South Africa, 989
Baobab trees in Africa, 896
Bara people, 1017

Baraba, steppe, 398
Baracoa, 795, 798
Baranof island, 770
Barawa, 936
Barbados island, 810; tar, 810
Barbary States, 904
Barbuda island, 807
Barcelona, 377; (Venezuela), 887; Gulf of, 885
Barcelonnettes, 243
Bareli, 489
Barents Land, 1044
Barents, W., voyage of, 1026
Bari, 365; Bari people, 933
Baringo lake, 931
Barma river, 879
Barisan mountains, 564
Barito river, 567, 568
Barka, 916, 917
Barkul, 540
Barmen, 288
Baroda, 497
Barotseland, *see* Barutseland
Barquisimeto, 887
Barrancas of Mexico, 776; Venezuela, 884
Barranquilla, 828
Barren grounds, 89; Lands, 682, 703
Barrier Mountains, N.S.W., 594; reef, 62; reef, map of, 587
Barrow-in-Furness, 163
Barrow river, 193
Barry Dock, 151, 165
Barth, explorer, 901
Bartica, 881
Barton, C. H., Australia, 575; Queensland, 587
Barutse people, 949
Barutseland, 949, 950
Barwan river, 594
Basel, canton, 264
Bashan, 449
Bashgul valley, 466
Basilicata, The, 364
Basin, 49; Ranges, Rocky Mountains, 765
Basque Province, 371, 374, 376
Basques, 133, 240, 372
Basra, 448
Bass Strait, 576, 610
Basse Terre, Guadeloupe, 809
Bassenthwaite lake, 163
Basseterre, St. Kitts, 808
Bastard people, 1013
Basuto people, 990
Basutoland, 992
Batabano, 797
Batang-hari river, 564, 566
Batalha-Reis, J., Brazil, 865
Batanga coast, 973
Batavia, 562
Bath, 177
Bathurst, Gambia, 962; N.S.W., 598, 600; Island, 614
Batjian island, 570
Baton Rouge, La., 750
Battak people, 557, 565, 566
Battambong river, 509
Batticalao, 504
Batum, 416
Baule, 957
Bautzen, 276
Bavaria, 284
Bavarian Palatinate, 286
Bavarians, 276, 300
Bawean Islands, 563
Bay, 50; Islands, 784; of Fundy, Tides of, 65; of Islands, Newfoundland, 705; Verte, 686
Baymen of British Honduras, 790
Beachy Head, 180
Bear Island, 1044
Bearn, Province, 252
Bear-Paw Mountains, 756
Beauce, 235, 251
Beaucaire, 253
Beaumont, Elie de, 37, 42
Bechuana people, 990
Bechuanaland, 1002–1003; Protectorate, 1002–1003
Bedawin tribes, 926
Bedford, 178
Bedouin, 926
Bek-Pak-Dala, desert, 396
Beechworth, Victoria, 609
Beeren Berg, 1044
Beetroot in France, 243; in Germany, 281
Behaim's Globe, 35
Bei-Kem river, 400
Beira, 946
Beireuse mountains, 380
Beirût, 451
Beja, 380; people, 898
Belad-al-Jerid, 913
Belaya river, 418
Beled-es-Sudan, 897
Belem, 873
Belep Islands, 644
Belfast, 193
Belgæ in Britain, 143
Belgica, ship, 1048
Belgica prima, 231
Belgique, 223
Belgium, 223–230; Origin of, 136
Belgrade, 336
Belik river, 447
Belize, 790; river, 789
Bell Sound, 1044
Bellary, 495
Belle Isle Strait, 704
Bellenden Ker Mountains, 589
Bellingshausen, explorer, 1048
Bellinzona, 265
Bello Horizonte, 875
Belts of Denmark, 208
Belyi Klyuch, 390
Ben Lomond, Tasmania, 611; Macdhui, 156; Nevis, 141, 156
Benadir coast, 936
Benares, 488
Benches=river terraces, 55
Bend of the Niger, 954
Bende, 968
Bendery, 409
Bendigo, 608
Bengal, 486
Bengali language, 479
Bengawan valley, 562
Benghazi, 916, 917
Benguela, 984; current, 70
Beni, 842; river, 841
Beni Saf, 908
Benin, 968; Bight of, 972; people, 967
Benkoolen, 562, 565
Bennett land, 1046
Benue river, 970
Beothuk people, 706
Bequia island, 810
Berar, 493
Berber, 927; race, 907
Berbera, 936
Berbers, 898; in Algeria, 910; in Portugal, 382; in Tripoli, 917
Berbice, 881; river, 879
Berezina, river, 390
Bergdamara people, 1013
Bergen, 207
Berici Monti, 355
Bering sea, 423; strait, 85, 423, 1033
Bering Vitus Arctic Voyage, 1027
Berlenga Islands, 379
Berlin, 295; Temperature and rainfall of, 273; Treaty of, 136
Bermejo river, 841, 850
Bermuda, 708–709
Bermudez, 887
Bern, canton, 264
Bernard, Augustin, New Caledonia, 644
Bernese Oberland, 258
Bernina mountains, 259
Berry, province, 251
Bertrand Alejandro, Chile, 843
Berwick, 160, 169; county, 160
Besançon, 252
Beskids, 313; passes, 311
Bessarabia, 416
Betafo district, 1016
Béthencourt, Explorer, 952
Betsiboka river, 1016
Betsileo people, 1017
Betsimisaraka people, 1017
Bhagalpur, 488
Bhamo, 496
Bhoten, *see* Bhutan
Bhutan, 503
Biafada people, 981
Biafra, Bight of, 973
Biainas people, 441
Bibundi, 974
Bicameral=with two Houses of Parliament, 632
Bida, 972
Bidassoa river, 233
Biddeford, Me., 725
Bielefeld, 289
Bienne, (Biel), 264
Biferno Fortore, river, 357
Big Game in Rhodesia, 1000
Big Horn Basin, 762
Bihar, 474; plain, 487
Bijagos island, 980
Bijuga island, 896
Bilbao, 376
Bileton island, 566
Bima, 572
Biminis, The, 803
Bingen, 288
Bingerville, 957
Bingeul Dagh mountain, 440
Binghampton, N.Y., 736
Bini people, 967
Biobio river, 848
Biogeography, 83–95; Definition, 4
Biological transition areas, 87
Bionomic Relations, 85
Biosphere, 4
Bird of Paradise in Dutch New Guinea, 643; in the Moluccas, 570; in New Guinea, 637, 640
Birkenhead, 172
Birmingham, 175; and the Black Country, Map of, 175; Ala., 728
Bisaya, 559
Bischoff, Mount, 611
Biscoe, explorer, 1048
Bisharin people, 898, 926
Bishop, Mrs., Korea, 542
Biskra, 912
Bismarck Archipelago, 640
Bismarck, N. Dak., 757

Bismarck range, 636, 639
Bismarckburg, 973
Bissao, 981
Bitlis, 444
Bitolia, 343
Bitter Lakes, 928
Biwa, lake, 547, 552
Bizerta, 915
Black Country, 175; Earth Region, 405; Earth Region of Russia, 390, 402; Forest, 269; Hills, 673; Hills, U.S., 757; Mountains, 164, 603, 670; Mountains (Austria), 311; Mountains, N.C., 716; Sea, 407; Sea, Circulation of, 67; Sea, Origin of, 41; Stream of Japan, 70
Blackburn, 173
Blackfoot tribe, 683
Blackpool, 174
Blackwater river, 188, 194
Blaeu, cartographer, 11
Blanc, Mont, 126, 237
Blanche Bay, 641
Blanco, Cape, 953
Blantyre, B.C.A., 950
Bleiberg, 305
Blida, 912
Bligh, Governor, 597
Blizzard, 756
Bloemfontein, 1006
Blomidon, Cape, 686
Blue Grass Country, 733; Gum Tree, 603; Mountains, India, 472; Mountains, Jamaica, 803; Mountains, N.S.W., 594, 596; Mountains, Wash., 764; Nile, 920; Ridge, 721
Bluefields, 788
Bluff, The, 628
Boavista Island, 979
Bober valley, 292
Bocca Serriola, 356
Bodegas de Babahoyo, 833
Bodenbach-Zetschen, 308
Bodensee, lake, 257
Bodmin moor, 167
Bodō, 207; Rain and temp. curves for, 200
Bœotia, 348
Boers, 990; in Transvaal, 1010
Boeroboedur, 563
Bog, 89
Boghaz Keui, 441
Bognor, 181
Bogong mountain, 602
Bogota, 828
Bogs of Ireland, 142
Bohemia (Böhmen), 306
Bohemian-Saxon Switzerland, 291
Böhmen, 306
Boian lands, 299, 305
Bois-le-Duc, 222
Bojador, Cape, 953
Bokhara, 408, 417
Bolama, 981
Bolan pass, 467, 499
Bolivar, province, 827, 833; the Liberator, 827
Bolivia, 840–843
Bolivian Plateau, 817
Bologna, 363
Boloven, 517
Bolton, 173
Boma, 978
Bombay, 491, 492; Longitude of, 31
Bomst, Vineyards at, 279
Bonaca island, 784
Bonavista bay, 705
Bonaire island, 866
Bône, 912
Bonifacio, strait, 358
Bonin islands, 545
Bonn, 288
Bonneville Lake in Utah, map, 766
Bonney, T. G., 37
Bonny, 968
Boothia Felix peninsula, 1028
Bora wind, 314, 319
Borchgrevink in Antarctic, 1048
Bordeaux, 252
Borderland, Hungarian, 323
Borders, definition, 112
Boreal plant division, 88
Borgu, 971; people, 970
Borneo, 566
Bornholm, 211
Bornu people, 971
Borrowdale, 163
Bosna Serail, 324
Bosnia and Herzegovina, 324
Bosporus, 330, 341
Boston, 179
Boston, Mass., 722; as a seaport, 715; Harbour islands, 724
Botany Bay, 584, 597
Bothnia, Gulf of, 197
Botletlie river, 1003
Botocudo people, 869
Botosani, 329
Bougainville Island, 647, 648
Bougie, 912
Boulder clay, Origin of, 57
Boulogne, 249, 250
Boundaries, 112; Maps, 113; between British Guiana and Venezuela, map, 878; of Colombia, 824; in South America, 823; of States, 712
Boundary at the Great American Lakes, 737; of Maryland, 718; between United States and Canada, 113; of Virginia, 718
Bounty Bay, 659; Island, 627
Bourbon island, 1024
Bourges, 251
Bourke, 600
Bournemouth, 181
Bowen, 591, 592
Boyacá, 827
Boyne, River, 192
Bozen, 306
Brabant, 221
Bradford, 170; on-Avon, 177
Bradano Baseuto, river, 357
Brahmaputra river, 471, 486, 495, 541
Brahui people, 499
Braila, 329
Brainard, Sergeant, Arctic Exploration, 1030
Brakna people, 956
Branco, Cape, 813
Brandenburg, 292, 293
Brandon, 696
Branholme, 611
Bras d'Or, 686
Brass, 968
Braunschweig, 293
Brava island, 979
Brave West Winds, 70, 78
Bray Head, 187
Brazil, 865–877; Configuration, 865; Geology, 867; Highlands, 815
Brazilian Island, 865, 874
Brazza, Savorgnan de, 958
Brazzaville, 959
Brda, 337; mountains, 307
Breakers, 67
Breccias, 52
Brecon Beacons, 164
Breda, 222
Breidafjördur, 212
Bremen, 294
Brenner Pass, 127, 302
Breslau, 293
Brest, 251
Brest-Litovsk, 409
Breton, Cape, 686
Brick-tea, 529
Bridgetown, Barbados, 811
Brieg, 265
Brier island, 686
Bright, 609
Brighton, 181
Brindisi, 365
Brionian islands, 314
Brisbane, 590, 591, 592
Bristol, 166
British Borneo, 559–560; Central Africa, 946–951; Columbia, 697–700; East Africa, 937–940; East African Protectorate, 938; Empire, def., 138; Empire, Extent of, 146; Empire, Statistics of, 196; Guiana, 878–881; Honduras, 787, 789; Isles, Climate of, 140; Isles, Configuration of, 139; Isles, Discovery of, 8; Isles, Fauna of, 143; Isles, Flora of, 142; Isles, Population of, 148; New Guinea, 635–638; North America, 679; North Borneo, 559; Occupation of Egypt, 925; Pacific Islands, 651; Peoples, History of, 143; South Africa, 997; Sudan, 969; West African Coast Colonies, 960–969
Brittany, 251
Brno (Brünn), 309
Broads of Norfolk, 182
Brocken, 290
Brockton, U.S., 726
Brody, 313
Broken Hill, 601
Brooklyn, 730
Brooks, W. K., on pelagic fauna, 94
Broome, 626
Brothers island, 936
Brown Willy, 167
Bruce, James, explorer, 900
Bruce Peninsula, 694
Bruce, W. S., explorer, 1048
Brue, André, 954
Bruges, 225
Brugg, 264
Brunei, 560
Bruni island, 613
Brünn (Brno), 309
Brunswick, duchy, 293
Brûsa (Prusa), 443, 444
Brussels, 228
Bruxelles, 228
Brüx, 307
Bryce, James, Natal, 993; Orange River Colony, 1003; Transvaal, 1007
Brythonic tribe, 162
Buache, Philip, contour lines, 31
Bubanjidda Mountains, 970
Bubi people, 953
Budapest, 321

Buddhism, 528
Buddhists in Tibet, 541
Budweis, 308
Buea, 974
Bueleng, 564
Buen Ayre (Bonaire) island, 806
Buena Ventura gulf, 824
Buenaventura, 828 ; rainfall, 819
Buenos Aires, 849, 853 ; temperature and rainfall, 819
Buffalo, N.Y., site, 738
Buffaloes in United States, 758
Buffavente Mountain, 445
Bug river, 271, 391, 415
Bugi people, 569
Buitenzorg, 563
Bujis Island, 384
Bukarest, 329
Bukovina, 300, 311; derivation, 312
Bulangan river, 567
Bulawayo, 1002
Bulgaria, 338–339
Bulgarian Foreland, 331
Bulgarians, 334
Bulhar, 936
Bulom people, 963
Bunda people, 983
Bundaberg, 591, 592
Bundelkhand, 497
Bunter, Geological position of, 51
Burdekin river, 591
Bure, 955
Burgas, 339
Burgos, 376
Burgundians, 260
Burgundy Gate, 125 ; province, 252
Burhanpur, 493
Burin peninsula, 705
Burlington, I., 744
Burma, 472, 495 ; geology, 473
Burma-Sunda mountains, 428
Burnet's Theory of the Earth, 37
Burnley, 173
Burntisland, 158
Burrard Inlet, 697, 700
Burslem, 175
Burton, Sir R. F., 901
Burton-on-Trent, Brewing at, 176
Buru, Cape, Malay peninsula, 422 ; New Guinea, 642 ; island, 570
Bury, 173
Bush Veldt, 1007
Bushire, 463
Bushmen, 898 ; in German S.W. Africa, 1013
Bussa, 972 ; rapids, 956
Bussaco Mountains, 379
Butte City, 761
Butung Island, 569
Butter in Denmark, 209
Buttermere, 163
Buxton, 169
Byzantine Empire, 134
Byzantium, 342

CAAGUAZU, Cordilleras of, 860
Cabanas, 798
Cabinda, 984
Cabo de la Nao, 370
Cabot, John, 10, 706; Voyage of, 1025 ; Strait, 704
Cabral, Pedro Alvares, discoverer, 870
Cabralia bay, 870
Cacao in Dutch Guiana, 882 ; in Ecuador, 833 ; in Grenada, 810 ; in Trinidad 812 ; in Venezuela, 887
Caconda climate, 983
Cactus, 766
Cactuses, 89
Cadabona, Pass of, 125, 356
Cadamosto, discoverer, 980
Cader Idris, 164
Cadiz, 376
Caen, 251
Cæsarea, 444
Cagliari, 365
Cagni, Captain, 1032
Caia, river, 381
Caiapo people, 869
Caicos islands, 805
Caillié, explorer, 900
Cairns, 591, 592
Cairo, Ill., 750 ; Egypt, 927
Caithness, 155
Calabria, 39, 357, 364
Calais, 249
Calcutta, 487 ; Temperature and rainfall of, 474
Caldas da Rainha, 382
Caldera, 656 ; of Crater Lake, 768
Caledon river, 1004
Caledonian Canal, 156
Calem, 502
Cali, Farrallones of, 824
Calicut, 494, 495 ; Temperature and rainfall of, 474
California, 765 ; Acquisition of 711 ; Gulf of, 668, 774 ; Valley of, 668, 768
Calisaya Cinchona, 842
Callao, 838 ; gold mines, 884
Calle-Calle river, 848
Callejon da Huaylas, 835, 837
Calpe, 378
Calycadnus river, 440
Cambodia, 517 ; river, 508
Cambodians, 518
Cambrian Formation, Geological position of, 51
Cambridge, 179 ; Gulf, 620 ; Mass., 731
Camden, 600
Cameron, Capt. V. L., explorer, 901
Cameroons (Kamerun), 973
Camel in Africa, 897 ; in N.S.W., 595 ; in W. Australia, 621 ; Wild, 540
Campania, 364
Campaspe river, 602
Campbell island, 627
Campbellton, 155
Campbelltown, N.S.W., 600
Campeche, 774, 781
Camperdown, 609
Campos in Argentina, 851 ; region of Brazil, 820
Campsie Fells, 157
Canada, Dominion of, 679 ; boundary with United States, 113, 723 ; Geological map, 680
Cañar, 833 ; (Naranjal) Basin, 831 ; Province, 833
Canará, 502
Canary Islands, 377, 952
Candia, 350
Canea, 350
Cannes, 253
Canso, Gut of, 686
Cantabrian Mountains, 371
Canterbury, 180 ; Plains, N.Z., 629
Canton, 535 ; climate, 526
Canuku Mountains, 879
Cão, Diogo, discoverer, 983
Cape Breton Island, 685 ; Coast, 964 ; Colony, 985-993 ; Colony, Railway system of, 991 ; of Good Hope, Discovery of, 10 ; Haitien, 802 ; River Goldfield, 592 ; Town, 992 ; Town, Longitude of, 31 ; Town, temperature and rainfall, 987 ; York Peninsula, 576, 587 ; York Peninsula Geology, 578 ; Verde Islands, 979-980
Capiberibe river, 875
Caprera Island, 358
Captaincies in Brazil, 870
Capture of rivers, 55, 59
Caracas, 887
Caramulo Mountains, 379
Caravan routes of Tripoli, 917
Caravaya, 839
Caraya people, 869
Carboniferous Formation, Geological position of, 51
Carchi, province, 833
Cardenas bay, 797
Cardiff, 151, 165
Cardigan Bay, 164
Carenero, 887
Cariaco Gulf, 887
Caribbean depression, Origin of, 41 ; Range, 887 ; Sea, 813 ; Sea, currents of, 69
Caribbees, 792, 805
Cariboo district, 699
Carib people (Carahibs), 800, 822, 869 ; at St. Vincent, 792, 810 ; in British Honduras, 790
Carinthia Duchy, 304
Carlisle, 160, 169 ; Bay, Barbados, 811
Carljohansvaern, 206
Carlsborg, 205
Carskrona, 204
Carlsruhe, 286
Carmel, Mount, 448
Carnarvon, 164
Carnegie, Hon. David W., Western Australia, 620
Carnic Alps, 316
Carniola (Krain), Duchy, 304, 305
Caroline Archipelago, 655
Carolina bight, 720
Carpathia, 388, 391
Carpathian foreland, 311 ; Lands, 311 ; Mountains, 299, 308, 327, 331
Carpentaria Gulf, 577, 578, 587
Carpentarian plain, 589
Carpets in Persia, 461 ; in Turkey, 341, 442
Carrantuohill, 194
Carriacou island, 810
Carrickfergus, 189
Carron Loch, 155
Carse Clays, 101 ; -lands, 153 ; of Gowrie, 157
Cartagena, Spain, 377 ; Colombia, 828
Cartago, 784, 789 ; (Costa Rica), 783
Cartailhac, M., 102
Carthage, 915
Cartier, Jacques, 691
Cartography, Development of, 12
Caaúpano, 888
Casa-Blanca, 905
Cascade Mountains, 672, 764, 767
Cascaes, 383

Cashel, 194
Caspian Sea, 396
Cassini de Thury, 29
Cassiquiare river, 816, 866, 884
Castile, 373, 376
Castletown, 186
Castries, 809
Castro-vireyna, 839
Cat Island, 803
Catalan language, 240
Catalonia, 374, 377
Catalonian dialect, 373
Catamarca, 855
Catania, 365
Cataract Hills, 613
Cataracts in Africa, 891; of the Nile, 921
Catingas region, 820
Catorce, 780
Catskill Mountains, 671, 732, 734
Cattaro, 315; bay, 337
Cattle in Argentina, 853; in Bechuanaland, 1002; on the Great Plains, U.S., 755; in India, 477; on the Prairies, 739; in Rhodesia, 1000; in Transvaal, 1008; in Uruguay, 857; in Venezuela, 885; rearing in Africa, 899
Cauca, province, 827; river, 824, 828
Caucasic or White Race, 102; Classification of, 107
Caucasus, 416; Configuration, 394; Mountains, 388
Causses, Plateaux of, 239
Cauterets, 252
Caves, Fauna of, 93; Formation of, 54
Cavalli river, 960
Cavité, 559
Cawnpore, 488
Caxamarca, 838
Cayambe Mountain, 830
Cayenne, 883
Cayman Islands, 805
Cays of Cuba, 793; in West Indies, 791
Cayo Romano, 797
Ceará, 874
Cedars of Lebanon, 450
Celebes, 555, 568
Celestial Equator, definition, 15
Celtica, 240
Cenis, Mont, tunnel, 247
Central Alps, 126; America, 782–790; America, Climate, 785; Rivers, 784; Belt of India, 472; Cordillera of the Andes, 835; Guatemala Mountains, 783; Lowlands of Ireland, 189; Plain of England, 171, 174; Plateau of France, 233, 237; Provinces of India, 493; Ranges of Australia, 579; Russia, configuration, 389
Cephalonia Island, 349
Ceram (Serang) Island, 570, 571
Cerro Cotzic, 783; de Apisco, 775; de Pasco; 836, 838; Duida, 884; Munchique, 824; Quemado, 783
Cervin, Mont, 258
Cetinje (Cettigne), 337
Cette, 253
Cettigne, 337
Ceuta, 377
Cevennes, 233
Ceylon, 503–507
Chachapoyas, 839
Chaco, 820, 860; territory, 856
Chad, Lake, 892, 958, 970
Chagos Archipelago, 1023
Chaix, Prof. Emile, Switzerland, 256
Chaki-Chaki, 940
Chalcidice peninsula, 330
Chaldea, 436
Chaleur Bay, 688
Chalk Country of England, 178; Escarpment, 177; Geological position of, 51
Châlons-sur-Marne, 249
Challenger, Cruise of, 12; in Antarctic, 1050
Chama river, 886
Chambal valley, 497
Chambezi river, 947, 975
Chamorro people, 655
Champerico, 788
Champion bay, 625
Champlain, lake, 728
Chancay, 838
Chancellor, Arctic Voyage, 1025
Chanchamayu, 839
Chanchan river, 831
Chandernagore, 503
Changkiakou, 532
Changsha, 533
Chauia people, 910
Channel Islands, 186
Ch'ao-sien, 542
Chapala lake, 776
Charcas, 841
Charente, river, 252
Charing-nor lake, 541
Charles Louis mountains, 643
Charlemagne (Charles the Great), 135, 300
Charleroi, 225
Charleston, S.C., site, 720
Charlestown, Nevis, 808
Charleville, 591
Charlotte Amalie, 806; Town, Dominica, 807
Charlottenburg, 296
Charlottetown, 687
Charnwood Forest, 174, 176
Chartered Company, 119
Charters Towers Goldfield, 592
Charts, 23, 34
Chat Moss, 172
Chatham Islands, 627
Chattisgarh, 493
Chats Rapids, 693
Chatyr Dagh, 394
Chaudiere Falls, Ottawa, 695; river, 691
Chaux-de-fonds, 264
Chebchi Mountains, 973
Chechs (Czechs), 308
Chekiang, 535
Chellia (Shellia) mountain, 907
Cheltenham, 177
Chelyuskin, Cape, 422; peninsula, 1046
Chemnitz, 291
Chemulpo, 543
Chengte, 532
Chengtu, 534
Cherbourg, 251
Cherchel, 911
Cherchen oasis, 540
Chernagora, 337
Chernoziom (black earth of Russia), 405
Cherry Creek, 760
Cherwell, river, 177
Chesapeake bay, 731; river, 718
Cheshire, 171, 174; plain, 165, 174
Chester, 166, 174
Cheviot hills, 168
Chibcha people, 822, 827
Chicago, 740; site, 738
Chichen-Itza, 779
Chichester, 180
Chidley, cape, 679
Chiem, lake, 272
Chifu, 533
Chignecto bay, 686
Chile, 843–848
Chili (China), 531
Chillagoe, 592
Chillan, 848
Chiltern hills, 178
Chilwa lake, 947
Chimbo, 833; river, 831
Chimborazo mountain, 830; province, 833
Chimbote, 837
China-clay, 167; grass, 529
China Proper, 521–536
Chinamen in British Columbia, 700; in Dutch East Indies, 561; in French Cochin-China, 518; in New Zealand, 633; in Siam, 510; in Straits Settlements, 512; in Trinidad, 812; in U.S., 769
Chinandega, 789
Chincha islands, 836
Chinde, 946; mouth, 945
Chinese Central Asia, 539; Empire, 521–542; Empire, Provinces of, 538; language, 527; people, 527
Chinook wind, 80
Chios island, 444
Chippewa river, 743
Chiquimula, 789
Chiquito people, 841
Chiriqui mountains, 824; volcano, 784
Chiromo, 950
Chisholm, G. G., Europe, 123; Chinese Empire, 521
Chiswina language, 1003
Chita, 419
Chitral, 499
Chittagong, 487
Chittim, 445
Chivril, 443
Chixoy river, 785
Chobi river, 1003
Choiseul island, 648; sound, 864
Chong, people, 510
Chontales, 784
Chorillos, 838
Chorography = description of places, 2
Chorokh river, 395
Choruk Su (Acampsis) river, 440
Choshi, 547
Christchurch, N.Z., 634; Temperature and rainfall of, 630
Christiania, 206; Longitude of, 31
Christiansand, 206
Christiansted, 806
Christiansund, 207
Christmas Island (Indian Ocean), 514; (Pacific), 658
Chronometer, 11, 18
Chrysopolis, 443
Chu river, 397
Chubut river, 850; territory, 856
Chudskoye, or Peipus, 128

Chun, Prof., in Antarctic, 1048
Chungking, 534
Chunnenugga ridge, 746
Chuqui-apu, 842
Chuquisaca, 842
Chur (Coire), 127, 263
Churchill river, 701
Chusovaya river, 414
Chutia Nagpur, 473, 487
Ciales, 799
Cibao mountains, 801
Cienfuegos, 796, 797, 798
Cilento mountains, 357
Cilician plain, 439
Cimbrian peninsula, 208
Cimone, Monte, 356
Cinchona in Ceylon, 505 ; in Peru, 837 ; in Ecuador, 832
Cincinnati, 737, 744
Cintra, 383
Circumdenudation, Mountains, 55
Cirque=corry, 50
Citará, Farrallones of, 824
Citlaltepetl, 775
City, definition, 162
Ciudad Bolivar, 884, 885
Clapperton, Explorer, 900
Clare Co., 194
Clarence peak, 953 ; river, 600
Clay, Weathering of, 54
Clays, 52
Clermont-Ferrand, 251
Cleveland, O., site, 738 ; Hills, 177 ; iron ore, 150
Clew Bay, 189
Cliff, definition, 49
Climate, definition, 72 ; diagrams, explanation of, 82 ; of Africa, 893 ; of Antarctic Regions, 1049 ; of Arctic Regions, 1037 ; of Asia, 401, 429 ; of Australia, 579 ; of Central America, 785 ; of Europe, 129 ; of North America, 673 ; of South America, 818 ; of West Indies, 792
Climatic areas, 77
Clontarf, 190
Clouds, 75
Cloves in Zanzibar, 939
Clyde, 151 ; river, 159, 160 ; Firth of, 157
Coahuila desert, 765
Coal in Austria, 305, 307, 309 ; in Belgium, 224, 225 ; in Brazil, 867 ; in Canada, 687, 699, 702 ; in China, 525 ; at Dover, 181 ; in France, 149, 244 ; in Germany, 149, 282 ; in India, 473 ; in N.S.W., 596 ; in New Zealand, 633 ; in Orange Free State, 1004 ; in Pennsylvania, 733 ; in Transvaal, 1008 ; in United Kingdom, 149 ; in United States, 149 ; in Victoria, 604 ; in Wales, 164 ; Measures, Geological position of, 51 ; Importance of, 52 ; river, 611
Coalbrookdale, 164
Coast-line and development of a country, 110
Coast range, B.C., 697, 698
Coatbridge, 159
Coati, island, 840
Coatzacoalcos, 781
Coban, 789 ; rainfall, 785
Cobequid Mountains, 686
Coblentz, 288
Cobre, 797
Coburg, 290 ; peninsula, 614 ; -Gotha duchy, 290
Coca in Peru, 837
Cochabamba, 842
Cochin, 498
Cochin-China, 517
Cochineal insect in Central America, 788
Cochrane, Lord, in Chile, 846
Cockburn Harbour, 805
Cockscomb mountains, 789
Coco de mer, 1023
Coconada, 495
Cocos (Keeling) islands, 514
Cod, Cape, 726
Cod-fishing in Newfoundland, 706
Coffee in Arabia, 453 ; in Brazil, 872 ; in British Central Africa, 950 ; in Central America, 788 ; in Ceylon, 505 ; in Colombia, 828 ; in Cuba, 796 ; in Dutch East Indies, 561 ; in Dutch Guiana, 882 ; in Jamaica, 804 ; in India, 494, 498 ; in Mexico, 780 ; in New Caledonia, 646 ; in Porto Rico, 799 ; in Réunion, 1024 ; in Venezuela, 888
Coíre de Perote (Nauhcampatepetl), 775
Cognac, 252
Coileque, 502
Coimbra, 381 ; Temperature and rainfall at, 372
Coire (Chur : Curia Rhætorum), 127, 263
Cojedes river, 885
Col=pass, 50
Colac, 609
Colchester, 182
Cold Wall current, 69
Cole, Grenville, A. J., Ireland 187
Coleraine, 193
Colla people, 841
Collie, 626
Collo, 912 ; dell'Altare, 125
Colne, estuary, 182
Coloane Island, 538
Cologne (Köln), 295
Colombia, 824-829
Colombo, 506
Colon territory, 888
Colonia, 859 ; do Sacramento, 871
Colonies, Forms of, 119
Colonisation, 118
Colorado, 757, 760, 762 ; Canyons of, 55, 672 ; Plateaux, 763 ; river, 763, 765 ; river (Argentina), 850
Columbia, S.C., site, 720 ; District of, map, 731 ; Plateaux, 764 ; river, 698, 764, 765
Columbus, 10 ; at Haïti, 801 ; at Trinidad, 812
Comanche tribe, 779
Comayagua, 789
Combaconam, 495
Comino islet, 366
Cominetto islet, 366
Commercial Geography, 120 ; definition, 5
Commodities, 120
Como, lake, 127, 354
Compass charts, 26
Comstock Lode, 767
Concepcion, 848
Conception bay, 705
Conchagua, volcano, 784
Conchaguita, volcano, 784
Conchos, Rio, 776
Congrehoy peak, 784
Conglomerates, 52
Congo basin, 892 ; basin, exploration, 901 ; discovery, 977 ; district, Angola, 983 ; Free State, 974-978 ; railway map, 977
Congress of Vienna, 136
Conical projections, 22
Conn, Lough, 193
Connaught, 193
Connecticut, 723, 725 ; valley, 723
Conococha lake, 835
Consequent rivers, definition, 58
Constance, 286 ; Lake, 257
Constantine, 912 ; department, 907
Constantsa, 329
Constantinople, 342 ; foundation of, 134
Constitucion, 848
Contas river, 875
Continent, 48 ; and Ocean, Permanence of, 38
Continental area, 46 ; climate, 81 ; climate in Africa, 894 ; Core of Asia, map, 423 ; form, symmetry in, 37 ; islands, 48 ; islands, definition, 62 ; plateau, 47 ; shelf, 47, 62 ; slope, 47
Contour lines, 32
Convection-currents in air, 75 ; in sea-water, 63
Conway, Sir W. Martin, The Arctic Record, 1025
Cook, Captain James, 11, 584, 605, 612 ; in Antarctic, 1048 ; Arctic voyage, 1027 ; in Hawaii, 661 ; in New Zealand, 632
Cook islands, 656 ; Mount, 628 ; strait, 627
Cook's bay, 659
Cooktown, 591, 592
Coolgardie, 625 ; goldfields, 623
Co-ordinates, 18
Coorong, lagoon, 614
Coosa river, 728
Copacabana peninsula, 840
Copenhagen, 210
Copiapó, 847
Coppename river, 882
Copper in Peru, 836 ; in S. Australia, 618 ; Mountains, 703 ; smelting at Swansea, 165
Coppermine river, 703
Copra in Samoa, 653
Copts in Egypt, 926
Coquimbo, 848
Coral Islands, classes of, 62 ; Darwin's Theory of, 41, 44 ; Distribution of, 66 ; Theories of, 62
Coral reefs in Cuba, 793 ; reefs in Florida, 748 ; reefs in Porto Rico, 799
Corbeil, 245
Cordillera of Australia, 593 ; of Bogota, 825 ; del Chocó, 824 ; of Ecuador, 824 ; of Merida, 885 ; of Perijá, 825
Cordoba, 376, 780 ; Argentina, 854
Corentyne river, 878, 879, 882
Corfu Island, 349
Corinth, 349 ; Ship Canal (map), 344
Corinto, 788
Corio Bay, 602
Corisco Bay, 953

Cork, 194
Cork in Algeria, 911; in Portugal, 382; in Tunisia, 914
Corn, *see* Maize, 739
Cornwall-Devon peninsula, 166
Cornwall, Jamaica 804
Coro, 886; mountains, 886
Corozal river, 799
Corrib, Lough, 193
Corrientes, 854
Corry, definition, 50
Cortez in Central America, 787
Corunna, 376
Corvo Island, 384
Coseguina volcano, 784
Cosmography, 2
Cosmoledo Island, 1023
Costa Rica, 789; physical geography, 784; seaports, 788
Côte d'Or, strait, 236
Côteau of the Missouri, 755
Cotentin peninsula, 251
Cotopaxi volcano, 830
Cotswold Hills, 177
Cottbus, 276
Cotton in India, 484; in Egypt, 922; in United States, 715; -spinning in Lancashire, 173
Coventry, 176
Cracow (Krakôw), 313
Cradle, Mount, 611
Crag and Tail formation, 52
Craiova, 329
Crates of Mallos, 35
Crater lake, Oregon, 768
Crater-lakes, 54
Crati, river, 357
Crazy mountains, 756
Cree tribe, 683
Cremona, 363
Creoles in Central America, 787; in Porto Rico, 800
Cretaceous Formation, Geological position of, 51
Crete, 350–351
Creux, Cape, 371
Crimea, 388, 393
Cripple Creek, 761
Croagh Patrick, 188
Croatia-Slavonia, 321, 323
Cromarty firth, 155
Cronstadt, 409, 411
Crooked Island, 803
Cross river, 965
Crossfell, 168
Crow's Nest Pass, 699
Croydon, 591
Crummock lake, 163
Crustal-movements, 53
Crust-block mountains, 53
Crust Blocks, 40, 41
Cryptozoic Fauna, 93
Crystal mountains, 959
Csallókoz Island, 317
Csepel Island, 317
Cuba, 793–798; railway map, 797
Cubango river, 982
Cuchillas, 794
Cuckmere river, 180
Cucos, 382
Cucuta, 886
Cue, 625
Cuenca, 833; basin, 830
Cuestas, definition, 752
Cuilcagh moors, 189
Cuitzeo lake, 776
Culebra island, 800
Cullarin mountain, 594
Culminating Area, 47
Cumana, 887
Cumbél, 825
Cumberland mountain, U.S., 732; plateau, U.S., 732; tableland, 671; valley, Pa., 728
Cumnock, 159
Cundinamarca, 827
Cunene river, 982, 1012
Cunnamulla, 591
Curepipe, 1022
Curia Rhætorum (Coire), 127
Curieuse island, 1023
Cupang, 573
Cuprija, 336
Cuyul, Rio, 799
Currants in Greece, 347
Currents of Atlantic Ocean, 69
Cush, 934
Cuttack, 488
Cuyabá, 874; rainfall and temperature, 868
Cuyuni river, 879
Cuzco, 839
Cyclades, 345, 349
Cycle of Erosion, 58
Cyclone tracks, 79
Cyclops mountains, 643
Cydamus, 918
Cymry, 162
Cynon Valley, 165
Cypress hills, 702
Cyprus, 445–446
Cythera island, 349
Czernowitz, 313
Czestochowa, 413
Czornahora (Black Mountain), 311

DAHOME, 957
Daiman river, 857
Dakar, 957
Dakhel oasis, 919, 928
Dallman, Capt., in Antarctic, 1048
Dallul Mauri river, 969
Dalni, 407, 419, 539
Damara people, 990
Damietta mouth, 921
Danakil tribe, 935
Danes, 209; in Greenland, 1043
Dar-el-Beida, 905
Dar-es-Salaam, 944; harbour, 940
Daro, Mount, 962
Darwin harbour, 864
Date palm in Egypt, 923; in Tunisia, 914
Davis, John, Arctic voyages, 1026
Davis Strait, 1035, 1036
D'Urville in Antarctic, 1048
De Grey river, 621
De Long, Captain W. G., Arctic exploration, 1,031
Dead Sea, 449
Debreczen, 322
Dede Agach, 343
Dee, river, 156, 165
Deerfield, 724
Defile, 50
Degree, Length of, 19, 25
Degree-net, 5
Dekkan, 429, 471, 491, 497, 498
Dekkan, geology, 473
Delagoa Bay, map, 946
Delaware, 718; river, 718
Delft, 223
Delhi, 490
Deli, 566
Delineation of ground on maps, 31
Delta, Formation of, 56
Deltaic islands, 63
Delys, 912
Demarcation Point, 679
Demavend mountain, 438
Dembea lake, 931
Demerara, 881; river, 879
Dempo, Mount, 566
Dendre river, 225
Denham, Explorer, 900
Deniliquin, 601
Denizli, 443
Denmark, 208–211; railway and steamer routes, 209
Denver, 760
Deposits, Classes of oceanic, 64
Depressed Area, 47; lands, definition, 48
Derbent, 416
Derby, 170
Derbyshire Coalfield, 150
Derna, 916
Derwent, river, 171; Tasmania, 611
Derwentwater, 163
Desaguadero, river, 840
Desertas island, 384
Deserts of Asia, 432; of Egypt, 919
Desirade island, 809
Desna, river, 390
Despoblados, 375
Dessau, 293
Desterro, 876
Detmold, 289
Detroit, Mich., site, 738
Dettifoss waterfall, 213
Deutsche Bund, 277
Development of countries, 115
Deventer, 222
Dévény, 316
Devil's peak, 992
Devon, 166
Devonian Formation, Geological position of, 51; Strata, name of, 166
Devonport, 167
Dezhneff Arctic voyage, 1027; Cape (East Cape), 399, 422
Dhahr el Kosdib Mountain, 449
Dhalac Islands, 935
Dhofar, 455
Dhuspas, 444
Diagonal Furrow, 332, 342
Diahot river, 645
Diano, Vallo di, 357
Diamond head, 662
Diamonds in Brazil, 867; in Cape Colony, 988; in Orange Free State, 1004
Diaphragm or first parallel, 26
Diarbekr, 448
Diatom Ooze, 65
Diaz, Bartholomew, discoverer, 900
Dicæarch, 26
Dickson, H. N., Atmosphere and Climate, 72
Diego Garcia, 1024; Suarez, 1020
Dieppe, 251
Dijon, 252
Dikhtau mountain, 394
Diluvium = Boulder-clay, Geological position of, 51; Origin of, 57
Dilli, 573
Dimbovitsa river, 329
Dinaric lands, 313; region, 333
Dindings, 514

Dineir (Apamea), 440, 443
Dingwall, 155
Dip slope, 59; definition, 55
Dirk Hartog island, 620
Disco island, 1041
Discovery, ship, 1048
Dismal Swamp, 721
Dispersal, Means of, 84
Distances, measurements on maps, 27
Distribution, Factors in, 86
Diu, 502
Diula people, 956
Divide = water-shed, definition, 50
Djokdjokarta, 563
Djidjelly, 912
Dnieper river, 390, 414
Dniester, river, 312, 392
Doab, 720
Dobruja, 327, 328, 329
Doce river, 875
Doe, Mount, 945
Dogs, The, 807, 808
Doko people, 934
Doldrums, 78
Dolomites, 306
Dombes plateau, 253
Dominion of Canada, 679–704
Dominion Land Survey in Canada, 684
Dominica island, 807
Don, river, 391; river, Ontario, 695; river, Yorkshire, 170
Donegal, 193
Donets river, 389, 391
Dongala, 569
Dongola, 927
Donnai river, 517
Dora Baltea, 126; Riparia, 126, 355
Dorah Pass, 466
Dordrecht, 233
Dorei, 643, 644
Dorking, 180
Dorsal (Stanovoi) mountains, 398
Dorset downs, 178
Dorylæum, 443
Douglas, 186
Douro river, 368, 380
Dover, 121, 152
Downing, Dr. A. M. W., Mathematical Geography, 14
Drainage-area, definition, 50
Drakensberg mountains, 891, 1007
Drammen, 206
Drave river, 303
Dravidian people. 480
Drenthe, 218, 221
Dresden, 291
Drift-ice, 1036
Drin river, 333
Drina river, 335
Drogheda, 192
Drohobycz, 312
Drowned valley, 50
Drude's plant regions, 88
Drumlins in New England, 724
Druse people, 451
Drygalski, Dr. E., explorer, 1048
Du Fief, J., Belgium, 223
Duaish people, 956
Duala, 975
Dublin City, 190, 192
Dubuque, I., 744
Ducos, 646
Dufourspitze, 126
Dugga, 915
Duke of York Islands, 640
Dulcigno, 337
Dumfries, 160
Duna river, 317, 391, 411
Dunaburg, 409
Dunamünde, 409
Dundas, Mount, 611
Dundee, 158; Natal, 994
Dunedin, 634
Dunes, 57; in Denmark, 208; in Germany, 269; in Holland, 216; in Nebraska, 758; in Peru, 834; in the Sahara, 928; in the Tarim basin, 540; in Western Australia, 662
Dungannon, 189
Dungeness, 181
Dunkirk, 249
Dunwich, 592
Dupian-Triel and contoured maps, 32
Duran, 833
Durani people, 467
Durazzo, 344
Durban, 994; temperature and rainfall, 987
Durham city, 170; coalfield, 150, 169
Düsseldorf, 295
Dutch Antilles, 806; Colonies—Statistics, 223; East Indies, 560; Guiana, 882; language, 220; New Guinea, 642–644; West Indies, 806; in Brazil, 871; in Guiana, 878, 880; in Mauritius, 1021; in South Africa, 990
Dux, 307
Dvinsk, 409
Dyak people, 557, 567
Dyke of igneous rock, 54
Dyle river, 225
Dyrrhachion (Durazzo), 344
Dzungaria, 539

EAGLE Island, 1023
Eaglehawk, 608
Earn, Loch, 156
Earth-folds, Theory of, 38
Earth, The, Form of, 14, 18; Plan of, 36–45; Surface, extent of, 61; Tetrahedral Theory of, 42
Earthquakes, 54; in Central America, 783; in Japan, 545; in Scotland, 156
East Africa, 930–946
East Anglian Heights, 178
East Cape, 422; (Dezhneff Cape), 399; East Cape, N.Z., 628
East India Company, 481, 512
East Prussia province, 293
East river, 730
Eastbourne, 181
Easter island, 659
Eastern Empire, 342; Equatorial Africa, 930–940; Ghats, 472; Rumelia, 332, 338; Turkestan, 539
Ebbw valley, 165
Ebro river, 369, 370
Echuca, 609
Ecuador, 658, 829–833
Ecuadorian Andes, 817
Eden river, 163, 168
Eder river, 288
Edessa, 448
Edge Land (Stans Foreland, 1044
Edinburgh, 158
Edmonton, 702
Edom, 449
Edward river, 601
Efik people, 967
Eger, 307
Egga, 972
Egmont, mountain, 628
Egypt, 918–929; Organisation of, 119
Eidsvold, 205
Eifel, 268, 287
Eighty-mile beach, 621
Eindhoven, 222
Einsiedeln, 263
Eisenach, 290
Eisenerz, 305
Eisling, 231
El-Arish, Wadi, 448
El-Araish, 905
El-Biar, 912
El Djem, 915
El-Erg basin, 900
El Gaah, 929
El Potrerillo Mountain, 794
Elba island, 353
Elbe river, 270, 291, 307
Elberfeld, 288
Elbeuf, 245
Elbruz mountain, 394, 395
Elbûrz range, 458
Elche, 371
Eldorado, 820
Electricity and Geographical conditions, 147
Elephant in Africa, 896; in Congo Free State, 976; in India, 477; in Niger delta, 966; in South Africa, 1000
Eleuthera island, 803
Eleutherus river, 448
Elevation and Subsidence, 40
Elgin, county, 156
Elgon mountain, 931
Elis, 349
Ellesmere Land, 1046
Ellice (Lagoon) Islands, 654
Ellichpur, 493
Elmetaita lake, 931
Elmina, 964
Elmira, N.Y., 736
Elonga mountains, 982
Elsinore, 210
Elster river, 291
Elswick Works, 170
Elvas, 381
Ely, 180
Embakh, river, 393
Emden, 294
Emilia, 363
Emmenthal, 264
Ems river, 270
Enclosed Seas, Circulation of, 66; definition, 61
Endeavour river, 592; strait, 587
Enere, lake, 392
Engadine, 263
England and Wales, 161–187
England, Population of, 148
English people, 162
Engler's plant distribution, 88
Enkeldoorn, 1002
Enns river, 303
Ensenada Honda, 800
Entebbe, 939
Entre Rios, 854
Environment, 2, 4; Adaptation to, 98; and Man, 115
Enzeli, 458
Eocene Formation, 51
Epe, 968

Ephesus, 443
Epirus, 343
Epping Forest, 182
Equator, definition, 15; province, 978
Equatorial Belt, Climate of, 78
Equidistant projection, 21
Erathosthenes, 26
Erdély (Transylvania), 322
Erebus, Mount, 1049
Erfurt, 290
Erh-hai lake, 535
Ericht, Loch, 156
Erie canal, 736; lake, old outlet, 740; lowland, 737
Eritrea, 935
Eritrean rift-valley, 931, 937, 941
Erjes river, 381
Ermenistan, 440
Erne, Lough, 193
Erödi, Dr. Béla, Hungary, 315
Erosion, Cycle of, 58; Features due to, 54
Errigal, 188
Erythræa, 935
Erzerûm, 443, 444
Erzgebirge, 291, 306
Escaut, river, 224
Escarpment, 55, 59; definition, 49
Esdraelon plain, 449
Esk river, Tasmania, 611
Eskimo, 106, 1043; in Canada, 684
Eskishehr (Dorylæum), 443
Esmeraldas river, 830, 831; province, 833
Esparto grass in Algeria, 909; in Spain, 372; in Tunisia, 914
Espichel, Cape, 380
Espigão Mountains, 866
Espinhaço mountains, 866
Espirito Santo, 875
Espiritu Santo, 647
Esquimalt, B.C., 700
Esquipulas, 788
Essen, 288
Essequebo, 881; river, 879
Essex, name, 144
Es Shayib mountain, 929
Essonnes, 245
Estoril, 383
Estrella mountain, 380
Estremadura, 374, 376, 380
Estuary, definition, 50
Esztergom, 322
Et-Taif, 453
Et-Tih, desert, 449
Eten, 837
Etive, Loch, 156
Etna bay, 642; Mount, 358
Eton, 182
Etheridge, 592
Ethiopia, 934
Ethiopian region, 87; Faunal Region, 896
Ethiopic or Negro Race, 1012; Classification of, 103
Etosa Pan, 1012
Etruscan Appennines, 356
Etruscans, 133, 360
Etsch river, 303
Etterbeek, 228
Eubœa Island, 348
Eucalyptus in Australia, 580; in Victoria, 603
Euganei, Colli, 355
Euphrates, river, 440, 447
Euphorbia in Africa, 896
Eurasia, 44, 123; Resemblance with N. America, 665; Structure of, 40
Euripus strait, 348
Europe, 123–421; Continent of, 123–137; Glaciated Area, map of, 129; Highland region, map of, 124; Railway map of, 137; Rainfall map of, 130
European Countries, Origin of, 135
Euskarian language, 240
Evans, Sir J., 100
Evaporation, 75
Everglades, 747
Evolution, 3, 12, 95; centres, 84
Ewa, 662
Ewarton, 804
Ewe people, 956
Exe, river, 166
Exmoor, 166
Exploits river, 705
Eyarbakki, 213
Eyre, Explorer, 617; lake, 615; peninsula, 579, 614

FAIDHERBE, Colonel, 954
Faizabad, 489
Fajardo, 800
Fakarava Island, 657
Falasha tribe, 934
Falcon, State of, 886
Falkland Islands, 863–864
Fall line in Canada, 690
Fall River, Mass., 725
Falmouth, 167
False Bay, 985
Falster, island, 210
Falun, 203, 204
Famagusta, 446
Fan people, 959
Fanning Island, 658
Farafah, oasis, 928
Faredgha, 916
Faro, 380, 383
Faroes, 211
Farra, 466
Farrallones of Cali and Citará, 824
Fars, 457, 463
Fas (Fez), 905
Faults, definition, 53
Fauna, Antarctic Arctic, 1039; Fresh water, 92; of Africa, 896; of Asia, 434; of Australia, 582; of the British Islands, 143; of Canada, 683; of Europe, 131; of Madagascar, 1017; of Shore, 91; of South America, 821
Faxaflói, 212
Fayal Island, 384
Fayum, 924
Fear, Cape, 720
Feathertop Mountain, 602
Fellahin people, 925
Felup people, 961
Fen-ho river, 523
Fenland of England, 179
Ferahan, 461
Ferencz Jozsef Peak, 316
Ferghana province, 395
Ferguson, John, Ceylon, 503
Feriana, 915
Fernando de Noronha island, 875
Fernando Po, 953
Ferrara, 363
Ferrel's Law, 56, 68
Ferro, island, 31, 952; Meridian of, map, 952
Ferrol, 376
Fertö (Neusiedler) lake, 316, 318
Fetishism in W. Africa, 967
Fez (Fas), 905
Fezzan, 918
Fianarantsoa, 1020
Ficksburg, 1004
Fife, 158
Figîg, oasis, 906
Figuera de Foz, 381
Fiji Islands, 651–653; map, 652
Filfila rock, 366
Fingal river, 611
Fingo people, 990
Finisterre Mountains, New Guinea, 639
Finke, River, 615
Finland, 408, 412
Finlay river, 681
Finno-Tartar language, 132
Finns, 201, 403
Finsteraarhorn, 258
Fiote people, 983
Firenze, 364
Firth, definition, 50
Fischer, Dr. Theobald, Italy, 352; Spain, 368
Fish river, 1012
Fiume, 323
Fjord, definition, 50
Fjords of South America, 814; of British Columbia, 697; of Greenland, 1040; of Spitsbergen, 1044
Flags, Scheme of colour for, 122
Flax in Egypt, 922
Flemish language, 225
Flinders Range, 578, 579, 615
Floe-ice, 1037
Flood plain, definition, 56
Floods of the Nile, 922; of the Ohio region, 744; of the Yellow River, 521
Flora, Arctic, 1038; of Africa, 895; of Asia, 432; of Australia, 580; Capensis, 988; of the British Islands, 142; of Canada, 682; of Europe, 131; of Madagascar, 1017; of Mexico, 777; of South America, 820
Florence (Firenze), 364
Florianopolis (Desterro), 876
Flores island, 384, 572
Florida, 747; Acquisition of, 711; Strait, 69
Floridsdorf, 310
Flower, Sir W., 96
Fly river, 635, 636
Flysch, 51
Fogo, island, 979
Föhn wind, 80, 259, 304; in Greenland, 1038
Fokien, 535
Fold Mountains, 44, 53; Map of, 40
Folding of rocks, 40
Folkestone, 152
Fonseca gulf, 783, 784
Fontana, lake, 850
Forbes, Dr. H. O., Malay Archipelago, 555
Forcados, 968; river, 969
Fore Alps, 126
Forest Carpathians, 311; of Dean, 164; of Wyre, 164
Forests, 89; and Rainfall, 131; Destruction of, 115; of Africa

895; of Asia, 432; of British Columbia, 699; of Brazil, 868; of Canada, 682; of Germany, 274; of India, 476; of New Brunswick, 688; of Paraguay, 861; of Russia, 403
Forez, plain, 234
Formigas islet, 384
Formosa, 552, 553; (Argentina) territory, 856
Fort Augustus, 156; Benton, Mont., 757; Dauphin, 1020; Dearborn, 740; Dubus, 644; George, 156; Marlborough, 565; William, 156; William, Temperature and rainfall, 141
Fortaleza, 874
Forth Bridge, 157, 159; Ports, 151; River, 158
Fortresses and Frontiers, map, 114
Fortunatæ Insulæ, 952
Fortune bay, 705
Fossils, 51
Foulness, 182
Foveaux strait, 628, 629
Foyers, Falls of, 156
Foyle, river, 193
"Fram," Drift of the, 1031
Framlingham, 609
France, 233–255; Central position of, 150; Coal production, 149; General geography, 239–255; Origin of, 135; Physical geography, 233–239; Physical structure of, map, 234; Rivers and canals of, 245; Total trade of, 151
Francia, Dr., in Paraguay, 861
Frankenwald, 268
Frankfort-on-the-Main, 286
Frankish Empire, 277
Franks, 276; in Holland, 220
Franklin, Sir John, Arctic voyage, 1028; Lady, and Arctic exploration, 1028; District, 702; Territory, 703
Franzensbad, 308
Franz-Joseph, Fjord, 1041; Land, 1044; Land, discovery, 1030
Fraser island (Hervey Bay), 579
Fraser river, 681, 698
Fray Bentos, 858
Fremantle, 625
Frome, 177
Frontier, def., 114; Changes of, 6; *see* also Boundaries
Fruit in Western Australia, 621
Fredericia, 210
Fredericton, 689
Frederikshald, 206
Frederikstad, 206
Frederiksten, Fortress of, 206
Freetown, 963; Climate, 962
French, Colonies, 119; Congo, 958; Guiana, 883; Guinea, 957; India, 503; Indo-China, 515–520; Pacific Islands, 651; Possessions, Statistics of, 255; Shore, Newfoundland, 708; Somaliland, 935; Sudan, 958; West Africa, 953–959; West Indies, 808; in Cape Colony, 990; in Quebec, 691
Friaulians, 360
Fribourg, canton, 264
Friedrich Wilhelmshafen, 641
Friendly Islands, 653
Friesland, 220, 222
Frigid Zone, 78
Fringing Sea, 61; reef, 62
Frisches Haff, 270, 294
Frisian islands, 270, 293
Frisians in Germany, 276; in Holland, 220
Frobisher, Sir Martin, 1025
Fu, Meaning of, 532
Fuchou, 535
Fuego, volcano, 783
Fuegian people, 822
Fuerteventura island, 952
Fujikawa river, 546
Fuji-san, mountain, 546
Fukien, 535
Fukuoka, 553
Fula Empire, 971; people, 956, 970, 981
Fulda, 289; river, 288
Funafuti, 654
Funchal, 384
Funcho mountain, 384
Fundy, Bay of, 686, 688
Fünen island, 210
Funing, 535
Funiu-Shan mountains, 523
Furneaux, Captain, 605; Islands, 610, 612
Futa Jallon, 957; plateau, 955
Fyen Island, 210
Fyne, Loch, 156

GABES, 915; Gulf of, 889
Gabet and Huc in Lhasa, 541
Gabr people, 463
Gabun, 958
Gadara, 450
Gaelic language, 145
Gafsa, 915
Gairdner, lake, 615
Galapagos islands, 658; climate, 70
Galashiels, 160
Galata, 342
Galatz, 329
Galdhöpiggen, 198
Galicia, 300, 311, 375
Galilee, 449
Galla people, 898, 933
Gallala Mountains, 929
Galle, 506
Gallegos people, 373; river, 850
Gallery Forests of Africa, 896
Gallipoli, 342
Galloway, 160
Galtee mountains, 189
Galveston, 754
Galway, 193
Gama, Vasco da, 900
Gambia, 961–962; origin, 960; river, 892
Gambier Islands, 658; Mount, 615
Gando, 971, 972
Ganges river, 471, 488
Garda, Lago di, 354
Gargano, Monte, 358
Garibalo Mountain, 395
Garigliano, river, 356
Gaspé peninsula, 690
Gastein, 306
Gateshead, 170
Gauhati, 495
Gauls, 240
Gault, geological position of, 51
Gauss, ship, 1048
Gawler, 619; range, 615
Gaya, 487
Gazaland, 945
Gazelle Peninsula, 640
Geba river, 980
Gediz Chai (Hermus) river, 440
Geelong, 609
Geelvink bay, 642
Geest, 219, 270
Gefle, 204
Gelderland, 222
Gellivara, 202, 204
Gemma Frisius, 2
General Range (Serra Geral) of Brazil, 866
Geneva canton, 264; lake, 258
Genevra pass, 126
Genoa (Genova), 361, 362, 363
Genoffa, Mount, 643
Geodesy=Science of measurement of the Earth, 3
Geographical Cycle, 57; mile, definition, 27; Discovery, history of, 7–12; Names, Orthography of, 33; Societies, 12
Geography, Political and Applied, 109–121; Definition, 2; Departments of, 3, 6; Practical value of, 7; Principles and Progress, 1–13
Geoid, 46
Geological Formations, Table of, 51; Maps, 34; Record, 84
Geology, relation to Geography, 50
Geomorphological theories, 37
Geomorphology=the Science of the forms of the Earth's surface, 2
George, lake, 594
Georgetown, Ascension, 1013; Demerara, 881
Georgia strait, 697
Georgian bay, 693, 742
Georgians, 403
Gera, 291
Geraldton, 625
Gerez, 380
Gerlache in Antarctic, 1048
Gerlachfalva (Ferencz József Peak), 316
German colonies in Brazil, 870, 876; Chile, 848; Confederation, 277; Empire, 266–297; East Africa, 940–944; Foreign Possessions Statistics, 297; New Guinea, 639–641; Pacific Islands, 651; Races, 108, 275; South-West Africa, 1012–1013, West Africa, 972–974.
Germany, 266–297; Coal Production, 149; Map of natural divisions of, 267; Origin of, 135; Total trade of, 151
Geuk Su (Calycadnus) river, 440
Geysir, 213
Ges people, 822
Ghats, 471
Ghadames (Cydamus), 918
Gharian, 916
Ghattar mountain, 929
Ghazni, 467
Ghent, 229
Ghilzai people, 467
Ghizeh, pyramids of, 924
Ghogra river, 471, 489
Giant's Causeway, 193; Mountains (Austria), 306
Giaour Dagh (Mons Amanus), 448, 450

Gibara, 798
Gibaros, 800
Gibraltar, 378–379
Gibson Desert, 622
Giedeser, 210
Gijon, 376
Gilbert (Kingsmill) Islands, 654
Gilead, 449
Gilolo Island, 570
Ginger in Jamaica, 804
Ginseng in Korea, 544
Gippsland district, 602
Gira river, 638
Girgenti, 365
Girin, 539
Girishk, 466
Gironde estuary (map), 252
Glacial Action, 57 ; in British Islands, 139 ; in Canada, 689, 693, 695 ; in Germany, 269 ; in New England, 724
Glaciation of Europe, map, 129 of North America, map, 669
Glaciers of the Alps, 126 ; of Greenland, 1042
Gladstone, 591, 592
Glamorgan, 164
Glarus, Alps of, 258 ; canton, 263
Glasgow, 151, 159 ; Growth of, 116
Glatz, 292
Gleichenberg, 306
Glen More, 156
Glenelg, S.A., 619 ; river, 603
Glenfarg, 157
Glittertind, 198
Globes, 35 ; Measurement of distance on, 27 ; Use of, 19
Globigerina ooze, 65
Globular projection, 21
Glommen river, 199, 205
Gloucester, 166, 177 ; Mass., 722
Gneiss, 51
Gnomonic projection, 34
Goa, 502
Gobi desert, 539 ; region, 433
Godavari, river, 472 ; valley, 473
Godowns=warehouses, 563
Godthaab, 1040, 1043
Goeschenen, 263
Gogolà, 502
Goitaca people, 869
Golconda, 431
Gold Coast, 963–964
Gold in Asia, 431 ; in Brazil, 867, 872 ; in British Columbia, 699 ; in British Guiana, 880 ; in French Guiana, 883 ; in Gold Coast, 964 ; in India, 473 ; in New Guinea, 638 ; in Mexico, 780 ; in Rhodesia, 998 ; in Transvaal, 1008 ; in Venezuela, 884 ; in Victoria, 603, 605 ; in West Australia, 623, 625 ; in Yukon, 703
Gold Mountains, B.C., 698
Golden Belt of Brittany, 243 ; Horn, 342
Goldsmid, Sir Frederic J., Persia, 457
Golfo Dulce, 783, 785
Gomera island, 952
Gonave island, 802
Gondar, 935
Gondwana rocks, 473
Gondwanaland, 41, 429
Gonye falls, 999
Goodenough island, 635
Gorée, 954, 956
Gorge, 50
Goro (Karo) Sea, 652
Göta canal, 203
Götaelf, river, 200
Götaland, 204
Göteborg 204
Gotha, 290
Gothenburg, 204
Gothland island, 198, 199, 205
Göttingen, 289
Goulburn, 600 ; river, 602, 603
Gourock mountains, N.S.W., 594
Goyaz, 866, 874
Gozo Island, 365
Graaff-Reinet, 991
Graben=rift-valleys, 53
Graciosa Island, 384
Grafton, N.S.W., 600
Grahamstown, 991, 992
Grampian Mountains, Victoria, 603
Grampians, 156
Gran, 322
Gran Canaria Island, 952 ; Chaco, 820, 860 ; Sasso d'Italia, 356
Granada, 377 ; Nicaragua, 789
Grand Bank, Newfoundland, 69, 706, 708 ; Bassam, 957 ; Canal of China, 530 ; Canyon, district, 54 ; Cayman, 805 ; Coulée, 765 ; (McLean) Falls, 701 ; Falls, New Brunswick, 688 ; Lahu, 957 ; Prairie, 755 ; Rapids, Mich., 737 ; Soufrière, 807 ; Turk Island, 805
Grande river, 980 ; Terre Guadeloupe, 809
Grandidier, Alfred, 1015
Grane, 452
Grangemouth, 151
Granite, weathering of, 54
Grant, explorer, 901 ; Land, 1046
Grass Veldt, 1007
Grassy vegetations, 89
Graubünden, Alps of, 259
Graz, 305
Great, Appalachian Valley, 728 ; Austral Plain of Australia, 577 ; Australian Bight, 576, 578, 614 ; Bahama Island, 803 ; Barrier Reef, map, 587 ; Basin Area of South America, 815 ; Bassa, 960 ; Batanga, 974 ; Bear Lake, 681 ; Belt, 208 ; Bras d'Or, 686 ; circle courses, 23 ; circles, definition, 20 ; Divide of Australia, 577, 578 ; Divide in Queensland, 588 ; Dividing Range, 602 ; Dividing Range of Australia, 593 ; Falls, Mont., 757 ; Fish Bay, 982 ; Glen, 156 ; Lakes of North America, 692, 736 ; Liakhoff Island, 1046 ; Plains of Kansas, 759 ; Karroo, 986 ; Kei river, 992 ; Plains of North America, 673 ; Plains of U.S., 755–760 ; Popo, 957 ; Powers of Europe, 136 ; Russians, 404 ; St. Bernard Pass, 126 ; Salt Lake, 766 ; Salt Lake, Animals of, 83 ; Scarcies river, 962 ; Slave Lake, 681, 703 ; Syrtes, 889 ; Wall of China, 521, 531
Greater, New York, 730 ; Sunda Islands, 561–568
Greco-Italic language, 132
Greece, 344–349
Greeks, 442 ; Civilisation of, 133 ; in Anatolia, 442 ; in Balkan peninsula, 334
Greely, General A. W., 1030
Green, J. R., 115 ; Lowthian, 37, 42
Green Mountain, Ascension, 1013 ; Mountains, 722, 724 ; River Basin, 763
Greenland, 666, 1040–1043 ; People of, 1042 ; Sea, Currents in, 1036
Greenock, 159
Greenwich, 184 ; Temperature and rainfall, 141
Gregory, Dr. J. W., Plan of the Earth, 36 ; Eastern Equatorial Africa, 930
Greiz, 290
Grenada island, 810
Grenadine Confederation, 827 ; Islands, 810
Grenoble, 245
Gretna Green, 161
Grey Mountains, N.S.W., 594
Greytown, 788, 789
Grijalva river, 776
Grimsby, 151, 179 ; fisheries, 149
Grindelwald, 258
Grinnell Land, 1030, 1046
Griqua people, 1005
Griqualand west, 991
Grisebach's plant areas, 88
Grisons, canton, 263 ; Alps of, 259
Groningen, 218, 221, 222
Gross Glockner, mountain, 302
Ground-nuts in Gambia, 961 ; in West Africa, 957
Grünwald, forest, 231
Gruyère, 264
Guadalajara, 780
Guadalcanar island, 648
Guadalquivir river, 369, 370
Guadeloupe island, 809
Guadiana river, 368, 381
Guajira peninsula, 886
Guajiro people, 827
Guallabamba river, 830
Guam island, 656
Guamanga, 839
Guanajuato, 780
Guañape island, 836
Guanches people, 952
Guanchos of Uruguay, 858
Guanica, 800
Guano, in Peru, 836
Guantanamo, 798
Guap Island, 655
Guaranda, 833
Guarani people, 107, 862, 869
Guardafui Cape, 936
Guatemala, 789 ; people, 787 ; physical geography, 783 ; seaports, 788
Guatemala city, rainfall, 785
Guayacuru people, 869
Guayaquil, 833 ; Gulf, 831 ; Rainfall, 819
Guayas province, 833 ; river, 831
Guaykuru people, 822
Gudbrandsdal, 199
Guebre, *see* Gabrs, 463
Guernsey, 186
Guiana, Colonies of, 878–883 ; Highland, 815
Guildford, 180 ; Gap, maps of, 32
Guinea, Gulf of, 889, 981 ; Islands of, map, 981
Gujarat, 491
Gujarati language, 479

Gulf Stream, 69, 708; Stream drift, 141; Stream drift in Arctic Sea, 1035
Gulhak, 462
Gunong, Agong mountain, 564; Api, island, 571; Tahan, mountain, 515
Gurabo, 799
Gurara, oasis, 906
Gurkhas, 503
Gwadar, 499
Gwai river, 999
Gwalior, 496, 497
Gwelo, 1002
Gyger, Map by, 31
Gympie, 591, 592
Gyulafehérvár (Karlsburg), 323

HAAR, 287
Haarlem, 222
Haase river, 271
Hadendoa tribe, 926
Hadramut (Hazarmaveth), 453, 455
Hague, The, 223
Haida people, 684
Haidrabad (Dekkan), 497; Sindh, 491
Haiphong, 520
Haïti and Santo Domingo, 801–802
Hakodate, 553
Hal-la-san, 542
Halifax, 170; Nova Scotia, 687
Halle-a-S., 290
Halmaheira (Gilolo) island, 570
Halmstad, 204
Halys, river, 440
Hamada el Homra, 916, 918
Hamar, 207
Hamburg, 294; as a free port, 118; temperature and rainfall of, 273
Hami, 539
Hamilton, 159; Bermuda, 709; Ontario, 695; river, 701
Hamitic people, 107, 898; in Africa, 897
Hammam Ali, 447
Hammerfest, 207
Hampshire, 186; Tertiary basin, 181
Han river, 523, 530, 532; (Korea), 543
Hand hills, 702
Hang-kiang, 536
Hanga river, 659
Hangchou, 535; Bay, 533
Hankow, 530, 531, 534
Hanley, 175
Hanoi, 520
Hanover, 294; province, 289
Hanság, 316
Hanseatic League, 112, 205, 207
Hanyang, 534
Hanyani river, 998
Haparanda, 204
Haram, 454
Harbour Grace, 707
Harbour Island, 803
Harfleur, 250
Hari-rud river, 465
Harlingen, 222
Harmsworth, Mr. A. C., and Arctic Exploration, 1030
Harra (lava beds), 453
Harran, 448
Harrar, 935
Harrat el-'Aue, 453
Harrat Khaibar, 453, 456
Harris, explorer, 906
Harrisburg, Pa., 727, 731
Harrogate, 169
Hartford, Conn., 723
Hartlepool, 170
Hartz, 268, 290
Haruj es Sod, 916
Haruk Mountain, 456
Haruku island, 571
Harvard mountain, 760
Harwich, 152, 182
Haslemere, 181
Hassa, 453, 456
Hastings, 181
Hatchings (hachures), 31
Hatteras, Cape, 720
Haud desert, 936
Hausa people, 971; States, 971
Havana, 798; Climate, 794; harbour, map, 793; province, 795
Havel river, 271
Havre, 250
Hawaii, 660–662
Hawaiian Chain of Islands, 651
Hawash river, 931
Hawke Bay, 629
Hawkesbury river, 597
Hay, 600
Hayes, Dr. Isaac J., Arctic Voyage, 1029
Hazara people, 467
Hazarmaveth, 455
Heart's Content, 705
Heaths, 89
Heawood, Edward, Continent of Africa, 889; Islands of the South Atlantic, 1013; Liberia, 959; Spanish West Africa, 952
Hebrides, 154
Hebron, 449, 451
Hecatæus, 26; Map by, 8
Hedin, Dr. Sven, 540
Heidelberg, 286
Heilbron, 1004
Heilprin, Prof. A., Mexico, 774
Hejaz, 453, 454
Hekla, volcano, 213
Helder, The, 219, 222
Helderbergs Escarpment, 736
Helena, Ark., 750, 754
Helgoland, 293
Hellbourg, 1024
Hellenic people, 346
Hellespont, 330
Helmand river, 457, 458, 466
Helsingborg, 204
Helsingfors, 412; Longitude of, 31
Helsingör, 210
Helvellyn, 163
Helvetians, 260
Hemihedral form of Earth, 42
Hengchou, 530
Henry the Navigator, 10, 900
Henry mountains, 763
Herat, 465, 466
Herbert, Mount, 639
Herberton, 592
Herbertshöhe, 641
Herbertson, Dr. A. J., Asia, 422; Continent of South America, 813
Herculaneum, 365
Hercynian strike, definition, 268
Hereford, 164, 166
Hereroland, 1012
Herero people, 1013
Hermon, Mount, 449
Hermoupolis, 349
Hermus river, 440
Hernösand, 204
Herodotus and the three Continents, 8
Hersfeld, 289
Heruj el Abiad, 916
Hervey bay, 579
Herzegovina, 324
Hesse, 286, 288
Hesse-Nassau province, 286, 288
Hessians, 276
Hetch-hetchy valley, 767
Hida-Echu Mountains, 546
Hierro (Ferro) island, 952
High plain, definition, 49; Tatra (Magas Tátra), 311, 316; Veldt, 986, 1007
Highland Rim, U.S., 733
Highlands, definition, 48; of Scotland, 154
Highwood mountains, 756
Hikurangi mountain, 628
Hildesheim, 289
Hill, Robert T., Cuba, 793; Porto Rico, 798
Hills, definition, 49
Himalaya, Geology of, 472; mountains, 41, 470
Himalayan States, 503
Himyaritic language, 934
Hinde, S. L., Congo Free State, 974
Hindi language, 479
Hindki people, 467
Hindu Kush mountains, 465, 489
Hindu people, 478
Hindus in Java, 562
Hindustan, 469
Hinlopen strait, 1044
Hinterland, 119
Hipparchus, 26
Hippo Regius, 912
Hiroshima, 553
Hispaniola, 801
Hit, 447
Hittites, 441, 450
Hjelmar Lake, 200
Hobart, 605, 613
Hobson Bay, 602, 606
Hodeida, 454
Hogolu islands, 655
Hog's Back, 180
Hokitika, Temperature and rainfall of, 630
Hokkaido, 552
Holarctic region, 87
Holderness, coast, 179
Holland, *see* Netherlands, 216
Hollow, definition, 49
Holstein, Duchy, 209
Holstenborg, 1040
Holy Roman Empire, 135
Holyhead, 164
Honan, 533
Honda, 828
Hondo river, 789
Honduras, 789; Gulf, 782; Mountains, 784; Physical geography, 784; Seaports, 788
Honfleur, 250
Hongay, 519
Hongkong (Hang-kiang), 536
Honolulu, 662
Hood, Mount, 767
Hope island, 1044
Horizon, definition, 15

Horn, Cape, 813
Horn Scientific Expedition, 617
Horn Sunds Tinder, 1045
Horse latitudes, 78
Horse, Wild, 540
Horsens, 210
Horsham, Victoria, 606, 609
Horta, 384
Horten, 206
Hortobágy puszta, 322
Horton Plains, 504
Hoskold, H. D., Argentine Republic, 849
Hot Lakes District, N.Z., 628; winds of Kansas, 760
Hottentots, 898, 989; in German S.W. Africa, 1013
Hour-Angle, definition, 15; -Circles, definition, 15
Hova people, 1017
Hualalai, 662
Huallaga river, 835, 838
Huancavelica, 839
Huanchaco, 837
Huanuco, 838
Huaqui, lake, 840
Huaraz, 837
Hubli, 492
Huc and Gabet in Lhasa, 541
Huddersfield, 170
Hudson, Arctic voyage, 1026
Hudson Bay, 666, 679, 692, 693, 700, 701; river, 728, 729; Valley, 728
Hudson Bay Company, 696
Huelva, 374
Huertas in Spain, 374
Hughenden, 591
Hugli river, 487
Huila mountain, 825
Huleh lake, 449
Hull, 151, 171; Canada, 692
Humber, 151; river, Newfoundland, 705; river, Ont., 695
Humboldt, A. von, 12; Bay, 642; Current, 70, 659; Current and climate in Chile, 845; Mont, 645
Humboldt's Plant-groups, 88
Hume, W. F., Egypt, 918
Humidity, 75; Relative, 76
Humirida mountains, 879
Hunan, 525, 533
Hungarian Borderland, 323; gate, 309; Plains (Kis-Alföld), 316; Sea, 318
Hungarians, 319
Hungary, 315–323; Statistics, 325
Hunger Steppe, 396
Hunsrück, 287
Hunte river, 293
Hunter Island, 610; river, 600
Hunza, 499
Huo Island, 657
Huon Gulf, 639; river, 611
Hupe, 534
Huron, Lake, 692
Huronian rocks, 693
Hwai river, 533
Hwang-ho river 521, 532, 533, 541; Floods in, 57
Hwangho, 424
Hyderabad, *see* Haidrabad
Hydra, island, 349
Hydrography and Development of a Country, 111; of Africa, 891; of Europe, 128; of Rhodesia, 998; *see also* Rivers
Hydrosphere = Collective waters of the Earth, 3, 4, 36; Divisions of, 61; Extent of, 60; Temperature zones of, 66
Hylacomilus (Waldseemüller), 35
Hypsographic Curve, 46, 47

IBADAN, 968
Ibarra, 833; Basin, 830
Iberian meseta, 368; peninsula, 368, 385
Iberians, 360, 372
Ibi, 972
Ibicui river, 877
Ibiza Island, 370
Ibo people, 967, 970; country, 965
Icaria island, 444
Ice Age, 128; in Great Britain, 139; *see also* Glacial Action
Icebergs, 63; and Gulf Stream, 69; of the Antarctic, 1049; of Arctic Region, 1037
Ice Fjord, 1044; of the Arctic Sea, 1036
Ice-sheet of America, 666; of Antarctica, 1048; of Europe, 128, 666; of Greenland, 1040
Iceland, 212–215
Ichang, 526, 530
Iconium, 443, 444
Ida, Mount, 350
Idaho, 764
Idda, 972
Idria, 305
Idzo people, 970
Igara people, 970
Igbiri people, 970
Ighli, 906
Iglau, 309
Igneous rocks, 52, 54; Weathering of, 57
Iguassu river, 876
Ijo people, 967
Ikopa river, 1019
Ili river, 540
Iliyats, 460
Illampu, mountain, 817
Illimani mountain, 817, 840
Illinois, 739
Illyrians, 334, 360
Ilmen, lake, 393
Iloilo, 559
Ilopango, lake, 784
Ilorin, 971, 972
Imatra cataract, 392
Imbabura, province, 833
Imerina, 1017
Inagua island, 803
Inca Indians, 836
Incas, Empire of the, 829; of Cuzco, 822
Independence bay, 1032
India, Climate of, 474–476; Empire of, 469–502; People of, 478; Railway map, 485
India-rubber in Bolivia, 842; in Brazil, 872; in Congo Free State, 975; in French Guinea, 957; in Gold Coast, 964; in Nigeria, 970; in Sierra Leone, 963
Indian desert, 471; Ocean, circulation of, 68; Ocean, currents in, 70; Ocean, origin of, 41; Ocean, position of, 61; or Oriental Regions, 87; Territory, 759
Indiana, 739
Indians in America, 711; in Canada, 683; in Mauritius, 1022; of North America, 676
Indic people, 108
Indigirka, river, 426
Indigo in Central America, 788; in India, 484
Indo-African Continent, 97; -Aryan people, 480; -China, 508–520; -European Telegraph, 462; -Gangetic plain, origin of, 41
Indonesian people, 108
Indrigiri river, 564
Indus delta, 491; river, 470, 476, 489
Inglefield, Sir Edward, Arctic voyage, 1029
Ingul river, 415
Ingur river, 395
Inhambane, 945
Inland-ice of Greenland, 1040–1042
Inland Sea, definition, 61
Inn river, 303; valley, 127, 263
Innsbruck, 305
Innerste river, 289
Innuits in Canada, 684
Insolation, 74
Interlaken, 264
Intermont basin, 49; basins in Rocky Mountains, 762
Internal Drainage, Basins of, 63; Old World Region of, 426
Inverness, 155, 156
Invierno in Central America, 785; in Colombia, 826
Inyanga plateau, 998
Iodine in Chile, 846
Ionian Islands, 349
Iowa, 751
Ipoh, 514
Ipswich, 182; Queensland, 593
Ipurina people, 869
Iquique, 847
Iquitos, 839
Iraklion, 350
Iran, Countries of, 457–468
Iranian desert region, 433
Iranic people, 108
Irawadi river, 472, 486, 496
Irazu, volcano, 784
Iregenat people, 956
Ireland, 187–194; Bogs of, 142; Mountain Axes of, 188; Rainfall of, 142
Iris, River, 440
Irish language, 145
Irkutsk, 418
Iron Gates, 331; Map of, 317
Iron Mountain, Mo., 753
Iron ore in Algeria, 908; in Cuba, 797; in France, 244; in Germany, 282; in Spain, 376; in United Kingdom, 149; in United States, 734
Iroquoian people, 106
Iroquois people, 684
Irrigation, 111; on the Great Plains, U.S., 757
Irtysh, river, 399, 400
Isabel island, 648
Ischia, island, 353
Iser mountains, 292
Ishikari-gawa river, 547
Ishmaelite people, 453
Iskanderun (Alexandretta), 451
Isker, river, 331; valley, 339
Islam in Africa, 899

Islands, 48; Classes of, 62; Continental, 48, 62; of the South Atlantic, 1013–1014; of the Western Indian Ocean, 1020–1024
Isle of Man, 186; of Pines, Cuba, 795; of Wight, 181
Ismid (Nicomedia), 443
Isobars, 77
Isonzo river, 314
Ispahan, 463
Issyk-kul, lake, 396
Istria peninsula, 313
Itala, 936
Italian peninsula, 352
Italians, 360; in Brazil, 869
Italy, 352–365; Origin of, 135
Itapicuru river, 875
Itasca, lake, 743
Itasy, lake, 1016
Itatiaia (Mantiqueira) mountain, 865
Itenez river, 841
Ithaca, island, 349
Itil, 414
Ivangrod, 409
Ivigtut, 1041
Iviza island, 370
Ivory Coast, 957
Ivory Nuts in Colombia, 826
Ixelles, 228
Ixtaccihuatl, 775
Izalco, volcano, 784

JABALPUR, 493
Jackson, Mr. F. G., and Arctic Exploration, 1030
Jacobshavn Glacier, 1042
Jacobites, 447
Jade in Kashgaria, 540
Jade Gate, China, 523
Jaffna, 506
Jaga people, 983
Jagersfontein, 1004
Jaguaribe river, 874
Jaipur, 496, 497
Jalapa, rainfall, 777
Jalisco, 774
Jaluit Trading Company, 655
Jamaica, 803; climate, 792
Jambali, Canal de, 831
Jambi, 565, 566
James Bay, 1014; Range, 615; River, U.S., 756; Town, 1014
Jammu, 499
Jamna river, 471, 488
Jan Mayen, 1044
Janina, 344
Japan, 545–554
Japen Island, 642, 644
Jarrah trees, 621
Jassy, 329
Jat people, 467
Jauja, 838
Java, 561; People of, 562; Sea, 563
Jaxartes, River, 397
"**Jeannette,**" Drift of the, 1031
Jebel Akhdar, 455, 916; Dokhan, 923; es Soda, 916; es Zeit, 919; Esh, 919; Gharib, 929; Nefusa, 916; Silsileh, 919; Sinjar, 447; Zeit, 923
Jebu people, 967
Jedda, 454
Jefara, 916
Jefferson City, Miss., 752
Jehol, 532
Jelalabad, 466
Jelebu, 514
Jenolan Caves, 600
Jequitinhonha river, 875
Jerba, 915
Jerid, 915
Jersey, 186, 187
Jerusalem, 451
Jervis, Cape, 614; island, 658
Jesuits in Brazil, 871; in Paraguay, 862
Jevero people, 832
Jews in Algeria, 910; in Balkan Peninsula, 335; in Europe, 133; in Galicia, 312; in India, 479; in Russia, 403; in Tripoli, 917
Jibuti, 935
Jigger, Spread of, 86
Jihun gorge, 439
Jihun (Amu-daria) river, 397; (Pyramus) river, 397, 440
Jishm island, 452
Jodhpur, 497
Jofra, 916
Johannesburg, 1011
Johansen, Lieutenant, 1031
Johnston, Sir Harry—British Central Africa, 946; British West Africa, 960; Tunisia, 913
Johor, 515; Bharu, 515
Joktanite People, 453
Jökülsá river, 213
Jones Sound, 1035
Jönköping, 204
Joost Van Dyke Island, 807
Jordan river, 449
Jorullo mountain, 775
Jostedalsbræ, 199
Jotunheim, 198
Jowi oasis, 456
Juan de Fuca, Strait, 697
Juan Fernandez Islands, 658
Juanacatlan, Fall of, 776
Jub river, 892, 931
Jubaland, 938
Jubones basin, 831
Jucuapa (Salvador), 783
Judæa, 449
Jujuy, 856
Juko people, 970
Julfa, 463
Julian Alps, 316
Julianehaab, 1043
Julius Cæsar, 143
Jumna, *see* Jamna
Jungfrau, 258; railway, 263
Jungles in Asia, 433
Junin, 838
Junki de Baracoa, 794
Jupiter, Ammon oasis, 928
Jura, mountains, 237, 256, 259, 285
Jurassic Belt of England, 176; Formation, position of, 51
Jute in India, 484
Jutland, 208, 210
Jyland, 208

KABIN, 508
Kabompo river, 947
Kabul, 467
Kabyles people, 910
Kabylia, 907
Kadesh, 450
Kadiac island, 770
Kaduna river, 970
Kaffraria, 992
Kafir, people of Kafiristan, 467; of Natal, 995; in South Africa, 989
Kafiristan, 468
Kafue river, 947
Kaga, 553
Kagera river, 942
Kagoshima, 551
Kahlengebirge, 310
Kaifeng, 533
Kaikoura range, 628
Kaikouras, 629
Kain, 461
Kaingaroa plains, 630
Kaiping, 531
Kairwan, 915
Kaisariyeh (Cæsarea), 444
Kaiser Wilhelm Canal, 283, 294
Kaiser Wilhelms Land, 639
Kaiserin Augusta river, 639
Kajeli, 571
Kalahari, 1012; Desert, 1002; Region, 989
Kalgan, 532
Kalgurli, 626; Goldfields, 623
Kalmuk people, 403
Kalungwisi river, 947
Kalymna island, 444
Kama, river, 390, 414
Kamchatka, 399, 429; Climate, 70
Kamerun (Cameroons), 973, 974; Bay, 973; Peak, 973
Kamiab, 465
Kamilaroi language, 584
Kamisa tribe, 459
Kampala, 939
Kampar river, 564
Kamyshin, 389
Kan, Dr. C. M., Dutch New Guinea, 642; The Netherlands, 216
Kan-Kiang river, 530, 533
Kanakas, 647
Kanara, 491
Kanarese language, 479, 492
Kanawha river, 732
Kanazawa, 551, 553
Kandahar, 467
Kandy, 506
Kane, Dr. Elisha Kent, Arctic Voyage, 1029
Kang-wön, 543
Kangaroo Island, 614
Kangaroos in Australia, 582; in the Moluccas, 570
Kangeang Island, 563
Kano, 971, 972
Kansas, 751; City, 759; plains of, 759
Kansu, 532
Kaoko, 1012
Kapuas river, 567, 568
Kapunda, 619
Kara-daria, river, 397
Kara Sea, 423
Kara Su river, 449
Karachi, 491
Karakoram mountains, 465
Karashahr, 540
Karen people, 510
Kariba defile, 999
Karikal, 503
Karimon Java island, 563
Karlsbad, 307, 308
Karlsburg (Apulum), 323
Kärnten, 304
Karo Sea, 652
Karpas, 445
Karpathos island, 445
Karri trees, 621

Karroo, 986; beds, 893; region, 988
Kars, 409
Karst, 305, 337; Map of, 314; phenomena, 54, 303, 356; phenomena in Cuba, 794; plateau, 303
Karufa river, 642
Karun river, 458
Kas, people, 510
Kashgar, 540
Kashgaria, 539
Kashkai tribe, 459
Kashmir, 489, 498
Kasim, 456
Kasongo province, 978
Kasos island, 445
Kassa, 322
Kassai province, 978; river, 975, 982
Kassel, 289
Katar coast, 452
Kathiawar, 497; peninsula, 478
Katif, 456
Katima rapids, 982
Katla, volcano, 213
Katrine, Loch, 160
Kattegat, 197
Kauai Island, 662
Kaulun, 537; peninsula, 536
Kauri pine, 631
Kavari river, 472, 495
Kavirondo, 938
Kawhia, 629
Kayan people, 567
Kayes, 958; rapids, 956
Kazan, 414; river, 684
Kazbek mountain, 395
Ke Island, 570, 571
Keane, A. H., Distribution of Mankind, 96
Kebnekaise, mountain, 198
Kebra Basa Rapids, 999
Kedah State, 509
Keeling or Cocos Islands, 514
Keewatin, 701
Keilberg, 291
Kel Antassar people, 956
Kel es Suk people, 956
Kelantan State, 509
Kelat, *see* Khalat
Keltic clans, 144; language, 132, 240
Keltie, Dr. J. Scott, Political and Applied Geography, 109
Kelto-Iberians, 107
Kelts, 360
Kelung, 554
Kema, 569
Kemp in Antarctic, 1048
Kennebec river, 723
Kennet, river, 179
Kent, 148
Kentucky caverns, 732
Kenya mountain, 891, 931
Keppel bay, 588
Kerbela, 448
Kerch strait, 394
Kerguelen island, 1024
Keria oasis, 540
Kerio river, 931
Kermadec islands, 60, 627
Kerman, 461, 463
Kerry Co., 194
Keswick, 163
Keuper, Geological position of, 51
Key West, 748
Keys (Cays) in West Indies, 791; of Cuba, 793
Khabur, river, 447
Khaibar Pass, 467, 490
Khalat, 499
Khamar-Daban, 398
Khama's Country, 1002
Khan Tengri mountain, 387
Khania (Canea), 350
Khansin wind, 920
Kharbin, 419
Khargeh oasis, 919, 928
Kharkov, 415
Khartum, 927
Khas tribe, 518
Khasia hills, 495
Khazr river, 447
Kherson, 415
Khingan mountains, 399, 539; river, 400
Khita (Hittites), 450
Khiva, 408, 418
Khmer people, 517, 518
Khomair, 907
Khone rapids, 516
Khorasan, 461, 463
Khotan, 540; oasis, 540
Khulm, 467
Kiakhta, 539
Kialing-kiang, river, 534
Kiangsi, 533
Kiangsu, 533
Kiau river, 538
Kiauchou, 538; Bay, 533
Kieff, 400, 414
Kiel, 210, 294
Kikuyu people, 933; scarp, 931
Kilauea, 662
Kilia mouth of Danube, 328
Kilimanjaro mountain, 891, 941
Killarney lakes, 194
Kilmarnock, 159, 161
Kimberley, 992; W.A., 621
Kina, 927
Kinabalu mountain, 567
King George Sound, 620, 625
King Island, 610; Karl's Land, 1044; Sound, 620
Kingani river, 941
King's County, 193; Lynn, 179
Kingsmill Islands, 654
Kingston, Jamaica, 804; Ont., 695
Kingstown, Dublin, 192; St. Vincent, 810
Kingtechen, 533
Kinsha-kiang river, 534
Kinta, 514
Kinzig valley, 287
Kipirsi, plateau, 955
Kircher, Athanasius, 34
Kirchhoff, Dr. Alfred, German Empire, 266
Kirghiz people, 403
Kirin (Girin), 539
Kirishima-yama, volcano, 54
Kiriwina Island, 635
Kirk, Sir John, 901
Kirkcaldy, 151, 158
Kirkwall, 155
Kirunga volcano, 891
Kis-Alföld, 316
Kishinev, 416
Kishon valley, 449
Kisogawa river, 547
Kitaigorod, 413
Kitakamigawa river, 547
Kiti, 655
Kitium, 446
Kittatinny valley, 728
Kiukiang, 533
Kiyev (Kieff), 406, 414
Kizil Irmak (Halys) river, 440
Kjöbenhavn, 210
Klagenfurt, 305
Klamath river, 768
Klang river, 514
Klarelf, river, 199
Klausenburg, 322
Kleber, 908
Kling people, 512
Klondike, Gold in, 771; river, 703
Klosterneuburg, 310
Klyuchev, Mount, 399
Knivskjelodden, 197
Kobdo, 539
Kobe, 553
Kokan, 417
Koki, 938
Kola, in Portuguese Guinea, 980; river, 412; nuts in Gold Coast, 964; nuts in Niger Delta, 968; nuts in Nigeria, 970; nuts in Sierra Leone, 963
Kolarian people, 480
Kolbe, Dr. F. C., Cape Colony, 985
Kolding, 211
Köln, 295
Kolomea, 313
Kolozsvàr (Klausenburg), 321, 322
Kolyma, river, 426
Komoe river, 957
Komono mountain, 954
Konakry, 957
Kong range, 954
Kongsberg, 205
Konia (Iconium), 443, 444
Königsau, river, 266
Königsberg, 293, 294
Königsee, lake, 272
Konkan, 491
Konstanz (Constance), 286
Kooringa, 619
Kootenay district, 699; people, 684
Kopais, lake, 348
Kopaonik mountains, 336
Kopjes, 1004
Korat plateau, 509
Korea, 542–544
Koreans, 543
Korintji lake, 564; mountain, 556
Korsör, 210
Korsovo, 343
Kos island, 444
Kosciusko, Mount 594
Koshtantau, mountain, 394
Kota-raja, 566
Kotonu, 957
Kotsuke, 547
Koweit (Grane), 452
Kowloon, *see* Kaulun
Kra, 509
Krain, 304
Krakatao, 563
Kraków, 313
Krapf, explorer,
Krasnoyarsk, 418
Krat hills, 510
Kratji, 973
Krefeld, 295
Kremenets, 392
Kremlin, 413
Krems, 303
Kribi, 974

Krishna, river, 472
Kriti, 350
Kronstad, Orange Free State, 1004
Krumen, 960; in Sierra Leone, 963
Kuban river, 395
Kuchar, 540
Kuching, 560
Kuiseb river, 1012
Kuku-nor Lake, 541
Kulja, 540
Kulpa, river, 330
Kuma, river, 395
Kumamoto, 553
Kumasi, 964
Kunene river, 892
Kupei-kow Gate, 532
Kura river, 395, 416
Kuram valley, 466
Kurdistan, 440, 461
Kurds, 403, 442
Kurile (Chishima) islands, 429, 554
Kurisches Haff, 272
Kurna, 447
Kuroshiwo current, 70, 547
Kurt Dagh mountain, 449
Kus, river, 904
Kushk, 417; railway, 465
Kustenji, 329
Kuyunjik (Nineveh), 448
Kwakioor people, 684
Kwala Kangsa, 514; Klang, 514; Lampur, 514; Pilah, 515
Kwango prov., 978; river, 982
Kwangchow, 535
Kwangsi, 535
Kwang-tri, 517
Kwangtung, 535, 536
Kwanza river, 892
Kwei river, 524
Kweichow, 534
Kweiyang, 534
Kwen-lun mountains, 428, 522, 539
Kwita, 964
Kwo-ibo, 968
Kwo people, 967
Kymmene Elf, 392
Kyoto, 551, 552
Kyrene, 916, 917
Kyrenia mountains, Cyprus, 445
Kyulu mountains, 931
Kyushu, 546, 553

LA BREA, 811; Calle, 912; Ceiba, 886; Condamine, 31; Guaira, 887; Guaira to Carácas, railway map, 887; Guayra Falls, 860; Maddalena, 358; Mancha, 372; Pallice, 252; Paz, 842; Plata, 854, 849; Plata, Bolivia, 842; Plata river, 815, 850; Rioja, 855; Rochelle, 252; Sagittaria, 656; Saona island, 802; Serena, 848; Superga, 355; Union, 788; Vaux, 264
Laaland Island, 210
Labrador, Climate, 674; Current, 69, 1037; Peninsula, 700
Labuan island, 559
Lacerda, J. de, explorer, 900
Laccoliths, 54; in Colorado, 761
Lachlan river, 594
Laconia (Sparta), 349
Ladakh, 499
Ladinos, 787
Ladins in East Africa, 945
Lado, temperature and rainfall, 894
Ladoga, lake, 128, 392
Ladrone islands, 44, 655
Lady Franklin bay, 1046
Laeken, 228
Lafia, 971
Laghouat, temperature and rainfall, 908
Lagoa das Sete Cidades, 384
Lagoon islands, 654
Lagoons on South American coast, 814
Lagos, 968; origin, 960
Lahontan, lake, map, 766
Lahore, 490
Laibach, 305
Laikipia scarp, 931
Laing, explorer, 900
Lajta river, 316
Lakadiv islands, 500
Lakeba islands, 652
Lake District of England, 163; Rainfall of, 142
Lake of the Woods, 113, 694; Region of Russia, 388, 392; Superior, navigation, 684
Lakes, and land development, 55; formation, 49; use of, 111; of the Alps, 128; of Argentina, 850; of Germany, 272; of Mexico, 776; of New England, 724; of North America, 669, 692; of Tasmania, 611; of West Australia, 622
Lambayeque, 837
Lammas, Mount, 648
Lammermoor hills, 157
Lampedusa island, 353
Lampong islands, 565
Lanark, 159
Lancashire, 168; coal-field, 150, 171
Lancaster sound, 1035
Lançerote island, 952
Lanchow, 532
Land, Climatic influence of, 79; forms, 46-59; Forms, classification of, 48; Plants, Groups of, 88; and People, 116; and Sea Breezes, 79; and Sea, proportions of, 61; and Water, 48; and Water, Effects of Heat on, 75; and Water, Tertiary distribution of, 97
Land's End peninsula, 167
Lander, explorer, 900
Landes, 236
Landshut, 292
Lang Son, 520
Langres, 237
Langdale, 163
Langeland, 210
Languages of Europe, 132; of India, 479; of Switzerland, map, 260
Langue d'Oc, 240; d'Oil, 240
Lao country, 517, 519; Kay, 519
Laon, 249; Globe, 35
Lapparent, Prof. A. de, Physical Geography of France, 233-239
Lapps, 201, 403
Lapworth, C., Fold Theory, 38, 45
Lara State, 887
Laraich (El-Araish), 905
Larantuka, 572
Larapinta land, 615
Larat island, 573
Larnaka, 446
Larne, 193
Larsen, Capt., in Antarctic, 1048
Larut, 514
Las Casas in Central America, 787; in Cuba, 796; Las Palmas, 952
Latacunga, 833
Latacunga basin, 830
Lateral valley, definition, 50
Laterite, Origin of, 57; in Asia, 432; in South America, 820
Latitude, definition, 15; Determination of, 16; Origin of term, 9; and Longitude as boundaries, 114
Lauderdale, Africa, temperature and rainfall, 894
Lauenburg (Duke of York) islands, 640
Launceston, Tasmania, 613
Laurentian, Highlands, 668, 734; Plateau, 680; Plateau in Manitoba, 695; Plateau in Ontario, 693; Plateau in Quebec, 689; Uplands, 671
Laurentide mountains, 690
Lauricocha lake, 835
Laurion, 347
Lausanne, 264
Lausitzer mountains, 292
Lava-plains, 54
Lawrence, Mass., 725
Lazi, people, 442
Lazistan, 440
Le Locle, 264; Mans, 251; Murgie, 358
Lea marshes, 183; river, 182
Leadville, 761
Lebanon, Mount, 449
Lebda, 917
Lee, river, 194
Leeds, 170
Leeuwarden, 222
Leeward Islands (British), 807; name, 813
Leghorn (Livorno), 364
Lehmann, map shading, 32
Lei-Chu, 520
Lei river, 525
Leicester, 176
Leicestershire, 174
Leiden, 223
Leine, river, 289
Leinster, 192
Leipzig, 291
Leiria, 379, 382
Leith, 151, 159
Leitha (Lajta) river, 316
Lek river, 218
Leki, 968
Leman, lake, 258
Lemberg (Lwow), 313
Lemnos island, 444
Lempa, Rio, 784
Lena basin, 426; river, 399, 400
Lens, 249
Leon, 376; Province, Ecuador, 833; (Nicaragua), 783, 789
Leonardo da Vinci, Maps of, 31
Leontes river, 449
Leopold II. lake, 975
Leopold range, 622
Leopoldville, 978
Lepini Mountains, 357

Leptis (Lebda), 917
Lerma, Rio (Santiago), 776
Lerma, valley 855
Leros island, 444
Lerwick, 155
Les Eboulements, 690
Lesbos island, 444
Lesseps, Ferdinand de, 925
Lesser Antilles, 805; Sunda islands, 571–573
Lett people, 275; language, 132
Letto-, Lithuanians, 403; -Slavs, 108
Leuk, alluvial fan at, 57
Leukas island, 349
Leukerbad (Louèche), 265
Leusitz, 291
Levant, 346
Levees of the Mississippi, 750
Leven, Loch, 157
Levkosia, 446
Levuka, 653
Lewes, 180
Lewis, island, 155
Lewiston, Me., 725
Lezirias, 380
Lhasa, 541
Liard river, 698
Lias, Geological position of, 51
Liau river, 538
Liautung, 538
Liberia, 959–960
Libertad, 789, 837
Libombo Range, 945
Libyan Desert, 928
Lichens, 89
Liddesdale, 161
Lidköping, 205
Liebana, valley, 371
Liechtenstein, 304
Lief Ericsen, 686
Liége, 225, 229
Liffey river 192
Lifu island, 645
Ligonia river, 944
Liguria, 363
Ligurian Appennines, 356
Ligurian people, 107, 360
Lim fjord, 210
Likungu, river, 944
Lille, 249
Lima, 837
Limagne, 252
Limagne, Plain of 234
Limay river, 850
Limburg, 218
Limerick, 190, 194
Limestone Alps, 302
Limestones, 52; Weathering of, 54
Limnoplankton, definition, 92
Limoges, 245, 252
Limpopo river, 892, 945, 1007
Lincoln, 178
Lincolnshire Wolds, 178
Linga, 463
Linggi, river, 514
Linnæus, 96
Linth river, 257
Linz, 305
Lion mountain, 992
Lions in Rhodesia, 1001
Lipari islands, 353
Lippe, principality, 289
Lisbon, 383; Longtitude of, 31
Lissa, 315
Litany (Leontes) river, 449
Lithosphere=solid crust of earth, 3, 4, 36; Areas of, 46
Lithuanian language, 132; people, 275
Little Batanga, 974; Belt, 208; Don, river, 391; Karroo, 986; Popo, 957; Rock, Ark., 754; Rocky Mountains, 756; Russians, 404; St. Bernard, 126; Scarcies river, 962; Syrtes, 889
Littoral Area of the Sea, 91; Fauna, 94
Liverpool, 151, 172; Mountains, N.S.W., 594
Livingston, Guatemala, 788
Livingstone, David, 12, 900
Livingstone mountains, 947
Livorno, 364
Lizard Head, 167
Llama in South America, 821
Llano Estacado, 673, 754, 759
Llanos, 821; in Colombia, 82
Lloró, 828
Loanda, 984; Ambaca railway map, 983; climate, 983; district, 984
Loando, temperature and rainfall, 893
Loango, 959
Lob (Lop) Nor lake, 540
Lobos island, 836
Lobsters in Newfoundland, 706
Locarno, 265
Lochy, Loch, 156
Lockwood, Lieutenant, Arctic exploration, 1030
Loddon district, 602; river, 607
Lodz, 413
Loess, Origin of, 57; in China, 522; of Mississippi, 738
Lofoten islands, 198, 199
Lofty Mount, 614, 619
Logan, Mount, 672, 681
Logwood in British Honduras, 790; in Central America, 787; in Cuba, 795
Lohombo river, 947
Loire, river, 235, 245, 251
Lois river, 573
Loja, 830, 832, 833
Loko, 972
Lokoja, 972
Lokunja river, 974
Loma Tina mountain, 801
Lomami river, 975
Lomas, definition, 834
Lombardy, 363; plain, 354
Lomblen islet, 572
Lombok-Ombay Islands, 572
Lombok Strait, 572
Lomnicz, 316
Lomond, Loch, 157
London, 182; Growth of, 115; Maps of, 28, 29; Plan of, 184; Port of, 150; Tertiary Basin, 182; Ont., 695
Londonderry, 191, 193
Long-cheou, 520
Long Island, 726; Range, 705
Longitude, definition, 16; Determination, 17; origin of term, 9
Longitudinal valley, definition, 50
Longonot mountain, 931
Lontar island, 571
Look-out, Cape, 720
Lop Nor lake, 540
Lord Howe island, 601
Loreto, 839
Lorient, 251
Lorraine, 241, 287
Los, Angelos, 768; Rios province, 833
Losuguta, lake, 931
Louèche, 265
Louisiania, 754; Acquisition, 711
Louisville, Ky., 744
Lourenço Marques, 945
Louviers, 245
Lovat river, 391, 393
Lovili mountains, 982
Low, Archipelago, 657; Countries, The, 216–232; plain, definition, 49
Lowell, Mass., 725
Lower, Austria, 304; California, 774; Greensand, Geological position of, 51; Tunguska river, 400, 426
Lowlands, definition, 48; of Scotland, 157
Loxa, *see* Loja
Loyalty Islands, 645
Lozère, Mont, 234
Lualaba province, 978; river, 946
Luang Prabang, 516, 519
Luangwa river, 948
Luapula river, 947
Lübeck, 294
Lubiana, 305
Lublin, 413
Lucerne, canton, 264; lake, 258
Luchu islands, 553
Lukuga river, 947
Lucknow, 489
Lugano, 265
Lugnaquillia, 193
Luleå, 204
Luleaberg province, 978
Lund, 204
Lunda district, 984
Lune valley, 169
Luneburg heath, 293
Lungo-e-Bungo river, 947
Lurio river, 944
Lusitanian language, 382
Lussinpiccolo, 315
Lutheran Church, 214; in Denmark, 209
Luxemburg, 230–232
Luzon Island, 558
Lwow (Lemberg), 313
Lyell, C., Theories, 38
Lyell, Mount, 611
Lynn, Mass., 726
Lyons, 253
Lyonesse, 167
Lys river, 225
Lysa Gora mountain, 392
Lyttelton, 628

MAAS, River, 216, 224
Maastricht, 219
Maazeh tribe, 926
Macabi Island, 836
Macao, 538
Macassar strait, 566
McCarthy Island, 961
Macchie, 131
McClintock, Sir Leopold, 1028
MacCluer Gulf, 642
McClure, Arctic voyage, 1028
Macdonnell range, 615
McDouall Stuart, explorer, 617
Macedonia, 338, 343
Macedonians, 334
Macgillicuddy's Reeks, 194

Macgregor, Sir William, British New Guinea, 635
Mackay, 591, 592
Mackenzie, Alexander, explorer, 699
Mackenzie district, 702; Plain, 629; river, 681; river navigation, 685
McLean Falls, 701
Macquarie river, Tasmania, 611
Mactan island, 559
Madagascar, 889, 1015–1020
Madeira Archipelago, 384; river, 873
Madjopait, ruins, 563
Madras, 494; longitude of, 31
Madrid, 376; longitude of, 31; Temperature and rainfall at, 372
Madura, 495; people, 562
Mæander river, 440
Mafra, 383
Mafrag river, 908
Magaliesberg mountains, 1007
Magallanes territory, 848
Magas Tátra, 316
Magdalen islands, 689
Magdalena, 827, 838; river, 824, 828
Magdeburg, 294
Magellan, 10, 558; Strait, 814; map, 843
Maggiore, Lago, 127, 354
Maghéra, 923
Magnesia, Anatolia, 443
Magnesian Limestone, Geological position of, 51
Magra river, 356
Magunda Mkali, 942
Magyarország, 315
Magyars, 320
Mahanadi, river, 471
Mahanoro, 1020
Mahavillaganga river, 504
Mahé, 503; island, 1023
Mahmel mountain, 907
Mahogany in British Honduras, 790; in Cuba, 795; in Ivory Coast, 957
Mahon, 377
Mahra, 455
Mähren, 308
Mährisch Ostrau, 309
Maidanpek, 336
Maidstone, 180
Maimachin, 539
Main, River, 285; valley, 286
Maine, 723, 725
Mainz (Mayence), 286
Maipo river, 847
Maipure people, 869
Maiquetia, 887
Maitland, N.S.W., 600
Maize in United States, 739
Majerda river, 913, 914
Majorca island, 370
Majunga, 1020
Makachinga, Mount, 398
Makalla, 455
Makar river, 914
Makassar, 569
Makri harbour, 439
Makta river, 908
Makwa people, 945
Mala Island, 648
Malabar, Coast, 494; forests, 477
Malabrigo Island, 836
Malacca, 512, 513; strait, 564
Malaga, 372, 377
Malagarazi river, 942
Malagasy people, 1017
Malaita (Mala) island, 648
Mälar lake, 200, 203
Malaria in Italy, map, 359
Malaspina glacier, 770
Malay Archipelago, 555; peninsula, 509; people, 557; States, 511
Malayans, 105
Malayo-Polynesian people, 105
Malden island, 658
Malditos, Montes, 371
Maldiv islands, 500
Malinche (Matlalcueyatl), 775
Malinke people, 956
Mallee country, 607; scrub, 595, 603
Mallorca island, 370
Malmesbury, Cape Colony, 991
Malmö, 204
Mälström current, 199
Malta, 365–367
Malta group of islands, 353
Malte-Brun, geographer, 12
Maluti mountains, 1004
Malvern hills, 164
Malwa plateau, 497
Mammoth Cave of Kentucky, 93, 732; remains in Siberia, 1046
Mamore river, 841
Man and Environment, 4, 115; primitive, 99; struggle for existence, 97
Manabi province, 833
Managua, 789; lake, 784, 785
Manaos, 873
Manangara, 1020
Manapouri lake, 629
Manar, Gulf of, 504
Manaro mountains, 594
Manasarowar lakes, 541
Manchester, 172; district, map of, 173; Ship Canal, 172; N.H., 725
Manchuria, 538
Mandal pass, 466
Mandalay, 496
Mandara mountains, 973
Mandenga people, 961, 962
Mandes, people, 956
Mandingo mountains, 955; people, 956, 981
Manga Reva, 658
Mangalore, 494
Mangoky river, 1016
Mangoro river, 1016
Mangroves in East Africa, 942; on Kamerun Coast, 973; in Yucatan, 778
Manihiki islands, 658
Manika plateau, 945, 997
Manila, 559
Maniototo plain, 629
Manisa (Magnesia), 443
Manitoba, 695–696; escarpment, 696, 701; lake, 696
Manitoulin island, 694
Mankind, Distribution of, 96–108; Divisions of, 102; table of chief divisions, 103
Manna river, 960
Mannheim, 286
Manning, Mr., in Lhasa, 541
Manomet hills, 726
Mansinam, 644
Mantiqueira mountain, 865, 876
Mantse people, 527
Mantua, 363
Manyami river, 908
Manych, as boundary, 123; river 395
Manzanillo, 781, 798
Maori people, 632
Map projections, 20–23
Maps and Map reading, 26–35; general, 30; geological, 34; measurement of distances on of areas, 28; scale of, 27; topographical, 29; of the World, value of, 13
Mapocho river, 847
Mar Chiquita, lake, 850
Mar da Palha (Straw Sea), 381
Maracaibo, 886; lagoon, 813 lake, 886
Marañon river, 816, 835
Maranhão, 874
Marathas, 481
Marathi language, 479, 491
Marave people, 945
Marble, 52
March river, 291, 308
Marches, def., 112; Italy, 364
Marco Polo, travels, 9; in Sumatra, 565
Marcy, Mount, 734
Mare island, 645
Mareb, 454
Maree, Loch, 155
Marenga Mkali desert, 942
Margaret island, 322; river, 639
Margarita island, 888
Margate, 181
Margalong river, 602
Marianne islands, 655
Marie Galante island, 808
Marienbad, 308
Marinus, geographer, 26
Maritime Cordilliera of the Andes, 835
Maritsa river, 332
Mark, definition, 112
Markets, 121
Markham, Admiral Albert Hastings, 1029; Sir Clements R., Bolivia, 840, Ecuador, 829, Peru, 834
Marlborough, 179
Marlborough Downs, 178
Marmarice, harbour, 439
Marmora (Propontis) Sea, 330
Marocco, 904–906; City, 905
Maronite, people, 451
Maros, 322
Marowyne river, 882, 883
Marquesas islands, 658
Marsden, Samuel, in New Zealand, 632
Marseilles, 253
Marshall islands, 654
Martapura, 568
Martha's Vineyard island, 726
Martigny, 265
Martinique island, 809
Marwar, 496
Mary river, 592
Maryborough, 591, 592
Maryland State, 731; boundary, 718
Masai people, 898, 933
Masandam, Cape, 452
Masarwa Bushmen, 1003
Masaya, 789
Mascara, 912
Mashad, 463
Mashuna people, 1001

Mashunaland, 998
Masina, 954
Mask, Lough, 193
Mason, W. B., Japan, 545
Massachusetts, 722
Massapé soil, 867, 875
Massowa, 935
Masulipatam, 495, 503
Matabeleland, 998
Matadi, 978
Matagalpa, 784
Matanzas, 798; province, 795
Mataram, 572
Matavai bay, 657
Matchedash bay, 693
Matese mountains, 356
Mathematical Geography, 14–25; definition, 3
Matlalcueyatl, 77
Matlock, 169
Mato Teepee, 758
Matochkin Shar, 1045
Mattas Virgeus, 868
Matterhorn, 258
Matto Grosso, 820, 873; Mountains, 866
Matupi island, 641
Maturin, 888
Mau, scarp, 931
Maui island, 662
Maule river, 844
Maulmain, 496
Mauna, Haleakla, 662; Kea, 660, 662; Loa, 660, 662
Mauritius, 1020; map, 1021; structure of, 41
Maya-Quiché language, 779
Mayaguana Island, 803
Mayaguez, 800
Mayence, 286
Mayo Co., 193; Island, 979; Kebbi river, 970
Mayon, Mount, 559
Maypures rapids, 884
Mazagan, 905
Mazama, Mount, 768
Mazamet, 245
Mazaruni, 879
Mazatlan, 781
Mbomu river, 975
Mecca, 453, 454
Mecklenburg-, Schwerin, 293; Strelitz, 293
Medain Salih, 453
Medanos, definition, 834
Medina, 453, 454
Mediterranean, civilisation, 7; flora, 131; Origin of, 41; plant-region, 433; region, rainfall of, 130; Temperature and depth of, 66
Medway, river, 180
Meerut, 489
Megalokastrom (Candia), 350
Meiningen, 290
Méjico, 774
Mekenes, 905
Me Klawng, River, 508; Kong river, 508, 509, 516, 517, 541; Nam Chao Praya river, 508
Mekran, 457
Melanchroi, people, 107
Melanesia, 635–648
Melanesian Chain of Islands, 651; Islands, 646; people, 557
Melanesians, 104
Melbourne, 605, 608
Melilla, 377
Melrose, 161
Melsetter, 1002
Melville island, 614 619
Memel river, 270
Memphis, 924; Tenn., 750
Menado, 569
Menai Strait, 164
Mendaña islands, 658
Mendere Chai (Mæander) river, 440
Mendoza, 855; river, 850
Mengo, 938
Menorca island, 370, 377
Mentawi islands, 557, 566
Menzies, 625
Meos tribe, 518
Merakish, 905
Meran, 306
Mercator, 11
Mercator's projection, 22
Meridian, definition, 15
Meridians, Initial, 31
Merim, lake, 857
Merka, 936
Merkusoord, 644
Merrick, Mount, 160
Merrimack river, 723, 725
Mersey estuary, 172
Mersina, 443, 444
Merthyr-Tydfil, 165
Merv, 397, 417
Mesa Toar, 794
Mesas in United States, 673; in Venezuela, 885
Meseta of Spain, 368
Meshiya, 916
Meskineh, 448
Mesopotamia, 436, 447–448
Mesorea, plain, 445
Mesozoic Formations, Geological position of, 51
Messenia, 349
Messina, Strait of, 358
Mestizos, 787
Meuse (Maas) river, 224, 229
Mexcala river, 776
Mexican Cordilleras, 775; Indians, 779; (Nahuatl Aztec) language, 779
Mexico, 774–781; City, 776, 781; City rainfall, 777; valley, map, 776; Longitude of, 31
Mezas mountains, 982
Mezen, 393
Miautse or Mantse people, 527
Michigan, Lake, old outlet, 740
Micronesia, Origin of, 41
Micronesian Islands, 653–656; Chain of Islands, 651
Middle Tunguska river 426
Middlesbrough, 177
Middlesex, name, 144; Jamaica, 804
Mies, 307
Migrations of Mankind, 97
Mikados of Japan, 550
Milan, 362, 363
Mildura, 607
Milford Haven, 164
Miliana, 912
Mill, Dr. H. R.—England and Wales, 161; Geography, Principles, and Progress, 1; Land Forms, 46; The Oceans, 60; Scotland, 152; United Kingdom, 138
Millstone grit, 165; Geological position of, 51
Milwaukee, site, 738
Min river, 524, 535
Minahassa, 569
Minas Geraes, 866, 875
Mindanao, 559
Mindello, 980
Minho river, 368, 380
Minneapolis, 743
Minnesota, 750, 751; river, 743, 750
Minorca island, 370
Minsk, 403
Miocene Formation, Geological position of, 51
Miquelon, 708
Mira river, 830
Miranyas people, 869
Mirim lake, 877
Mirzapur, 489
Misahöhe, 973
Mischabelhörner, 258
Misery, Mount, 808
Misiones, territory, 854, 856
Mississippi delta, 749; floods in, 57; flood plain, 749; river, 743, 748; river as boundary, 712
Missolonghi, 348
Missouri, 751; Côteau, 701; highlands, 752; river, 756
Mist, 76
Misti, volcano, 838
Mitla, 779
Mitrevitza, 341
Mitshi people, 970
Mitta Mitta river, 602
Mitylene Island, 444
Mixteco-Zapoteca language, 779
Mlanje, Mount, 944, 948
Moab, 449
Mobile, Ala., 746
Moçambique, 944, 945, 946
Mockler-Ferryman, Major A. F., Nigeria, 969
Mödling, 310
Moën Island, 210
Mœris, Lake, 924
Moero Lake, *see* Mweru
Mogadishu, 936
Mogador, 905
Mogul Empire, 480
Mohammed Ali, 925
Mohammedanism in Asia, 437; in Egypt, 926; in Europe, 134; in Niger delta, 967; in Nigeria, 970; in Persia, 460; in West Africa, 956
Mohawk, as ancient outlet of Lake Michigan, 742; valley, 736
Mohilev, 390
Moi tribe, 518
Mok-po river, 543
Molasse, 51
Moldau river, 307
Moldavia, province, 327
Mole, river, 180
Molenbeek, 228
Molise, 364
Molocath river, 904
Mologa, river, 389
Molokai island, 662
Moluccas islands, 570
Mombasa harbour map, 937
Mona island, 800
Mona passage, 801
Monadnocks, 59, 716
Monastir, 341
Mönch, mountain, 258
Moncorvo, 382
Moncton, 689

Mondega, cape, 382
Mondego, river, 381
Mong-tse, 520
Monghyr, 488
Mongolia, 539
Mongolic or Yellow Race, 102, 105
Mongols, 105
Monmouth, 163, 164
Mono lake, 767
Monoclinal fold, 53
Monongahela river, 734
Monrovia, 960
Mons, 225
Mons Jovis pass, 126
Monsoon region, 79; of Asia, 431
Monsoons, 78; and ocean currents, 68; of India, 474
Montagne Noire, 234
Mont Cenis pass, 126
Montana, 756
Monte Rosa, 258
Montego bay, 804
Montenegro, 337
Monterey, 777
Montevideo, 858, 859
Montferrato hills, 355
Monti Cristi mountains, 801
Montmorency Fall, 690
Montpellier, 253
Montreal, 691; temperature and rainfall, 682
Montreux, 264
Montserrat, 807, 808
Moonta, 619
Moors in Algeria, 910; in Senegal, 956; in Spain, 373
Moore, Mr. J. S., on Lake Tanganyika, 93
Mooroopna, 609
Moquegua, 838
Moradabad, 489
Morant Cays, 805
Morar, Loch, 155
Morava valley, 332, 336
Moravia, 308
Moravian Gate, 291
Morawhanna, 881
Morecambe bay, 163
Moreton bay, 590
Morlaix, 251
Mormons, 766
Mormugão, 502
Morne à Garou, 810
Morne Diablotin, 807
Morocco, *see* Marocco, 904
Morro Punti, 795
Morvan, 234
Moscow, 413; Rainfall and temperature, 401
Mosel, River, 287
Moseley, Prof. H. S., 94
Mosi-a-tunya Fall, 999
Moskenesö, 199
Moskva river, 413
Mosquito Indians, 787
Mossamedes, 984
Mosses, 89
Mossi plateau, 955
Mostaganem, 911
Mostar, 324
Mosul, 448
Motala, 204; river, 199
Motatan river, 886
Motril, 372
Moulmein, *see* Maulmein
Mount Desert, 723; Gambier, 619; Morgan, 593; Morgan gold-mine, 592; Royal, 690
Mount's Bay, 167
Mountain Chains, 53; chains, origin of, 37. Climates, 81; Papuans (Alfurs), 644; definition, 49, and Climate, 110; Rainfall on, 80
Mourne mountains, 188, 193
Moravian Gap, 308
Moxo people, 841
Mozambique, *see* Moçambique, 944; Channel, currents, 70
Mpini, 974
Msta, River, 391, 393
Muang-Tai (Siam), 508
Muar, 515
Mudania, 443
Mud line, definition, 95
Mühlhausen, 287
Muir, Glacier, 770
Muir, Dr. Thomas, Cape Colony, 985
Mukden, 538
Mulattoes in Central America, 787
Mulde district, 291; river, 291
Muldraughs hill, 733
Mull, 155
Mullens, Rev. Dr., 1015
Müller Range, 622
Multan, 490; Temperature and rainfall of, 474
Muluia river, 904
München, 284
Münden, 288
Munich (München), 284
Munich, Longitude of, 31
Muniong mountains, 594
Munster, 193
Münster, 294
Munster's "Cosmographia," 11
Mur, river, 303, 305
Murchison district, W.A., 625
Murcia, 373, 377; province, 371
Murendat river, 931
Murghab river, 397
Murman coast, 412
Murray, Sir John—Antarctic Regions, 1047; Divisions of Earth's crust, 46; on the mud-line, 95; The Oceans, 60–71; Theory of coral islands, 63
Murray district, 602; river, 577, 578, 594, 603, 609
Murrumbidgee, 601; river, 594, 600
Murshidabad, 488
Murua Island, 635
Murzuk, 918
Muscat, 452, 456
Muschelkalk, Geological position of, 51
Muscovy Company, 1025
Mush, 444
Musk Ox in Arctic, 1039; in Canada, 683
Muskhogean people, 106
Muss Alla mountain, 332
Mustapha Superieur, 912
Mustique island, 810
Muzo, 828
Mweru, lake, 947
Myres, J. L.—Tripoli, 916
Mysore, 473, 498
Mytho, 519

NADA Island, 635
Nadir, definition, 15
Nafa, 553
Nagar, 499
Nagar-Avely, 503
Nagasaki, 553
Naghamadi, 927
Nagoya, 547, 552
Nagpur, 493
Naguabo, 800
Nahr el-Kebir (Eleutherus) river, 448
Nahr ez-Zerka, river, 450
Nahua tribe, 779
Nahuatl Aztec language, 779
Nahuel-Huapi, lake, 850
Naiguâta mountain, 887
Nairn, 156
Naivasha, lake, 931
Nak-tong river, 543
Nam, Ing river, 509; Kok river, 509; Loë river, 509; Mun river, 509; Nan river, 508
Namaland, 1012
Namaqua people, 990
Namuli mountains, 944
Nan-shan mountains, 524, 533
Nanchang, 533
Nancowrie, 500
Nancy, 250
Nandi, 938
Nangamessi, 572
Nanking, 533
Nankow pass, 532
Nansen, Dr. Fridtjof, 12, 1031; The Arctic Regions, 1033
Nanshan, mountains, 523
Nantes, 251
Nantucket, 726
Naples (Napoli), 364; Temperature and rainfall of, 359
Napo river, 831
Napoli, 364
Naranjal basin, 831
Narbada river, 471; valley, 473, 493
Narellan, 600
Narenta, 324; river, 313, 333
Nares, Sir George, Arctic Voyage, 1029
Narev river, 391
Naricual, 887
Narova, river, 393
Narragansett bay, 723
Nashville basin, 733
Nassarawa, 972
Nassau, 803
Natal, 993–997; Brazil, 874
Natalia, 995
Natchez, La, 750
Nathorst, Professor, 1032
Nations, definition, 109, 117
Nauhcampatepetl, 775
Naurouse, Passage of, 125
Nauta, 816
Navigation, 23
Navigator Islands, 653
Naxos, 347, 349
Naze, The, 182
N'Bundo people, 983
Neagh, Lough, 188, 193
Neapolitan Appennines, 356
Nearctic region, 87
Nebraska, 751, 759
Neckar basin, 285
Nederlandsch Oost Indie, 560
Nefuds, 452
Negapatam, 494, 495
Negri Sembilan, 514
Negritoes, 104
Negro, or Ethiopic Race, 102; river, 873
Nagar, 499
Nagar-Avely, 503
Nagasaki, 553
Naghamadi, 927
Nagoya, 547, 552
Nagpur, 493
Naguabo, 800
Nahr el-Kebir (Eleutherus) river, 448
Nahr ez-Zerka, river, 450
Nahua tribe, 779
Nahuatl Aztec language, 779
Nahuel-Huapi, lake, 850
Naiguâta mountain, 887
Nairn, 156
Naivasha, lake, 931
Nak-tong river, 543
Nam, Ing river, 509; Kok river, 509; Loë river, 509; Mun river, 509; Nan river, 508
Namaland, 1012
Namaqua people, 990
Namuli mountains, 944
Nan-shan mountains, 524, 533
Nanchang, 533
Nancowrie, 500
Nancy, 250
Nandi, 938
Nangamessi, 572
Nanking, 533
Nankow pass, 532
Nansen, Dr. Fridtjof, 12, 1031; The Arctic Regions, 1033
Nanshan, mountains, 523
Nantes, 251
Nantucket, 726
Naples (Napoli), 364; Temperature and rainfall of, 359
Napo river, 831
Napoli, 364
Naranjal basin, 831
Narbada river, 471; valley, 473, 493
Narellan, 600
Narenta, 324; river, 313, 333
Nares, Sir George, Arctic Voyage, 1029
Narev river, 391
Naricual, 887
Narova, river, 393
Narragansett bay, 723
Nashville basin, 733
Nassarawa, 972
Nassau, 803
Natal, 993–997; Brazil, 874
Natalia, 995
Natchez, La, 750
Nathorst, Professor, 1032
Nations, definition, 109, 117
Nauhcampatepetl, 775
Naurouse, Passage of, 125
Nauta, 816
Navigation, 23
Navigator Islands, 653
Naxos, 347, 349
Naze, The, 182
N'Bundo people, 983
Neagh, Lough, 188, 193
Neapolitan Appennines, 356
Nearctic region, 87
Nebraska, 751, 759
Neckar basin, 285
Nederlandsch Oost Indie, 560
Nefuds, 452
Negapatam, 494, 495
Negri Sembilan, 514
Negritoes, 104
Negro, or Ethiopic Race, 102; river, 873

Negroes in Africa, 897; in Central America, 787; in Nigeria, 970; in Porto Rico, 800; in South America, 822; in United States, map, 747
Neisse river, 292
Nejd, 452, 456
Nejef, 448
Nejran, 453
Nekton, definition, 90
Nemours, Algeria, 911
Neogœic Realm, 88
Neolithic Ages, 100
Neotropical region, 87
Nepaul, *see* Nipal
Nepean river, 600
Nerchinsk, 419
Neritic region, definition of the, 95
Nerone, Monte, 356
Ness, Loch, 156
Nestorians, 442
Netherlands, The, 216–223; Configuration, map, 217; History of, 136
Netherlands India (Nederlandsch Oost Indie), 557, 560
Netze river, 271
Neuchatel, canton, 264
Neuhausen, 263
Neuilly, 250
Neu-Pommern (New Britain), 640
Neuquen river, 850; territory, 856
Neusiedler lake, 316, 318
Neva river, 393, 410
Nevada, 765
Nevado de Colima, 775; de Toluca, 775
Nevis island, 807, 808
New Almaden, 768; Amsterdam, 881; Bedford, 725; Benin, 968; Britain, 640; Brunswick, 688-689; Calabar, 968; Caledonia, 644-646; Castile, 376; Chaman, 466, 467; England, 721; England mountains, N.S.W., 594; Forest, 181; Georgia Island, 648; Grenada, 827; Guinea or Papua, 635; Hampshire, 723; Haven, Conn., 723; Hebrides, 646; Holland, 584; Ireland, 640; Kanawha river, 728; Mexico, 762; Orleans, 715, 749; Orleans, site map, 750; Orleans, temperature and rainfall, 675; Providence, 803; Ross, 193; Siberian Islands, 1046; South Wales, 593-601; South Wales, rabbit-proof fences map, 595; Spain, 780; Westminster, B.C., 700; Westminster, temperature and rainfall, 682; World, 36; York, 727, 729; York City, 715, 730; York, temperature and rainfall, 675; Zealand, 627-634; Zealand, railway map of, 633
Newara Eliya, 504
Newburgh, N.Y., 736
Newcastle-on-Tyne, 151, 169; Natal, 994; N.S.W., 596, 600
Newchwang, 538
Newer Appalachian Belt, 717, 727
Newfoundland, 704-707; Grand Banks of, 69, 722
Newhaven, 180
Newnes, Sir George, and Antarctic Exploration, 1048
Newport, Mon., 165; R.I., 723
Ngami Lake, 1003
Nganhwei, 533
Nganking, 533
Ngansichou, 539
Ngauruhoe mountain, 628
Nguru mountains, 941
Niagara, 735; Escarpment, 694; Gorge, 742; and the Great Lakes, 741; river, 681
Niaouli tree, 645
Niari-Quillu river, 958
Nicaragua, 789; Lake, 784, 785; physical geography, 784; seaports, 788; ship canal, 785
Nice, 241, 253
Nickel, in Canada, 694; in New Caledonia, 646
Nicomedia, 443
Nicosia (Levkosia), 446
Nicoya Gulf, 783
Nictheroy, 876
Nielsen, Prof. Yngvar—The Scandinavian Peninsula, 197–202
Niger basin, 892; Coast Protectorate, 965–968; delta, climate, 966; delta, map, 965; river, 900, 954, 955, 958, 969
Nigeria, 969–972
Nihon (Nippon), 545
Niigata, 547, 551, 553; Temperature and rainfall of, 547
Nijmegen, 222
Nikki, 958
Nikko, 548
Nikobar islands, 500
Nikolayev, 409, 415
Nile, basin, 892; delta, map, 921; river, 920, 930
Nilotic peoples, 933
Nilgiri hills, 472, 494
Nimes, 253
Nimrud Dagh mountain, 440
Nineveh, 448
Ningpo, 535
Nipal, 503
Nipe, 798
Nipigon, lake, 694
Nippon, 545
Nish, 336
Nisyros island, 444
Nithsdale, 160
Nitrate of soda in Chile, 844, 846
Niuchwang (Newchwang), 538
Nizarites, 453
Nizhnii-Novgorod, 406, 414
Nonni river, 539
Nordenfjeldske, district, 206
Nordenskiöld, Baron A. E., 1029; Sea, 423; Dr. O., explorer, 1048
Nore river, 193
Norfolk, U.S., 729; Va., site, 720; Island, 601
Norge, 205
Noric Alps, 316
Norman Conquest, 144
Normandy, 250
Normanton, 591
Norrköping, 204
Norrland, 204
North America, climate, 673; America, configuration map, 670; America, Continent of, 664–678; America, map of glaciation, 669; Carolina shores, 720; Dakota, 750; Devon, Arctic America, 1046; Downs, 180; -East Land, 1044; -East Passage, 11, 1026, 1029; German Low Plain, 292; Island, N.Z., 627, 629; Magnetic Pole, 1028; Mountains, 686; Polar Regions, 1025-1046; Sea, Circulation of, 97; Shields, 151, 170; -West Passage, 11, 1026, 1028; -West Provinces of India, 488; -Western Territories of Canada, 702
Northern, Dvina river, 399; Rhodesia, 946; Territory, South Australia, 614, 619; Zambezia, 946
Northers of Texas, 755
Northam, W.A., 626
Northampton, 178
Northumberland, coal-field, 150, 169; county, 168; Strait, 686, 687
Northumbria, 153
Northwich, 174
Norway, 205-207
Norwegian, language, 214; Sea, 61
Norwich, 182
Nosibe island, 1016
Nosob river, 1012
Notogœic Realm, 88
Notre-Dame, Bay, 705; Mountains, 690
Nottingham, 170; coal-field, 150; county, 171, 174
Notwani river, 1002
Nou island, 646
Noumea, 645, 646
Nouvelle Calédonie, 644
Nova Goa, 502
Nova Scotia, 685–687
Novaya Zemlya, 423, 1045
Novgorod, 392
Novi-Bazar, 343
Novo-Georgievsk, 409
Nu-Aruak people, 822, 869
Nuevitas, 798
Nuevo Leon, 777
Nuka-Hiva island, 658
Nupe, people, 971
Nuremberg, 286
Nürnberg (Nuremberg), 286
Nusa-laut island, 571
Nutmeg in the Moluccas, 571
Nutrias, 885
Nuyts Land, 617
Nyasa, Lake, 942, 947; discovery, 901
Nyasaland, 946
Nyborg, 210
Nyika, 937
Nyong river, 974

OAHU Island, 662
Oases, of Libyan Desert, 928; of the Sahara, map, 905
Oats in United Kingdom, 148
Ob river, 397, 398
Ob-Irtysh region, 426
Obidos, 873
Obsequent rivers, definition, 59
Ocean, Basins, General form of, 60; Basins, Permanence of, 65; boundary, 113; current, 68; depth, greatest, 60; drift, 68; functions of, 71; as a highway, 71; river, 8; surface temperature, 65
Oceania, 649
Oceanic, climate, 81; civilisation,

8 ; deposits, 64 ; islands, definition, 62 ; plateau, 47
Oceans, 60–71 ; Circulation of, 68 ; origin of, 41 ; in political geography, 120 ; salinity of, 63
Ochil Hills, 157
Ocós, 788
Ocreza river, 381
Odense, 210
Odeondo, 968
Oder river, 270, 291, 294, 308
Odessa, 415
Odyi river, 998
Oea (Tripoli), 917
Oesterreich (Austria), 300
Oetanata river, 643
Oetzthal, 306
Ofanto, River, 357
Ofoten fjord, 204
Ogasawara-jima, 545
Ogowe river, 892, 958
Oguta, 968
O'Higgins, General, in Chile, 846
Ohio, region, 735 ; region, glacial action in, 738 ; river, 732, 737, 744 ; river as boundary, 712
Oich, Loch, 156
Oil, Islands, 1023 ; palm in Niger delta, 966 ; seeds in India, 484
Ojibways tribe, 683
Oka river, 390, 414
Okavango river, 1003, 1012
Oker river, 293
Okhotsk, Sea of, 398, 424
Okhvat, lake, 391
Okinawa island, 553
Okinawa-ken, 553
Oklahoma, 759
Oland, Island, 199
Olekma, river, 400
Oleleh, 566
Old, Calabar, 967 ; Castile, 376 ; Red Sandstone formation, Geological position of, 51 ; Servia, 343
Old World, 36 ; World, Structure of, 40
Oldenburg, 293
Older Appalachian belt, 717, 722
Oldham, 173
Olifant's river, 1007
Oligocene Formation, Geological position of, 51
Olinda, 875
Olive trees in France, 244 ; in Italy, 360 ; in Palestine, 450 ; in Spain, 374 ; in Tunisia, 914
Olfusá, river, 213
Olmütz, 309
Olonets, 392
Olten, 264
Olympus, 345 ; Mount, 439 ; mountain, Cyprus, 445
Omaha, 759
Oman, 455 ; district, 453
Omatoko, Mount, 1012
Ombay islet, 572
Omdurman, 925
Omi, 547
Omo river, 931
Omotepe volcano, 784
Omsk, 418
Onega, Lake, 128, 393
Onetapu plains, 630
Onilahy river, 1016
Onin, 642
Ontake mountain, 546
Ontario, 692–695 ; during the Ice Age, 742 ; peninsula, 693
Oolite, Geological position of, 51
Oolitic Escarpment, 161, 177
Oozes, Oceanic, 38
Opium in China, 526 ; in India, 484
Opobo, 968
Oporto, 381, 384
Öræfajökull, 213
Oran, 911 ; department, 907
Orange, 253 ; N.S.W., 600 ; basin, 892 ; Free State, 1005 ; River, 986, 1004, 1012 ; River Colony, 1004–6 ; River Sovereignty, 1005
Oranges in Jamaica, 804
Oranienbaum, 411
Orbe, river, 258
Orchids, epiphytic, 93
Ordnance Survey, 29
Ordovician Formation, Geological position of, 51
Oregon, 764, 765 ; acquisition of, 711
Orellana, 871
Orenburg, 416
Öresund, 197
Orfordness, 182
Oriental, or Indian region, 87 ; province of Ecuador, 833
Oring-nor, lake, 541
Orinoco, delta, 813 ; river, 816, 884
Orissa, 486, 487
Orizaba, mountain, 775
Orkney, 155
Orléans, 251
Orleansville, 912
Ormuz, strait, 425
Oro province, 833
Orontes river, 448, 449
Ortelius, cartographer, 11
Orthographic projection, 221
Orthography of Geographical names, 33
Ortler mountain, 302
Oruro, 842
Osage river, 753
Osaka, 552
Oscar, Frederiksborg, 204 ; Land, 1044
Oshima island, 553
Osnabrück, 289
Österdal, 199
Östergötland, 204
Östersund, 204
Ostrich, in Africa, 897 ; feathers in Cape Colony, 987
Ostro-Goths, 260
Otaheite, 656
Othere, Voyage of, 1025
Otomi language, 779
Ottawa, 695
Ottilia (Ramu) river, 639
Ottoman, Empire, 340 ; Turks, 436
Otway, Cape, 602
Ouachita Mountains, 753, 759 ; ridges, 673
Oudh, 488
Ourique, 380
Ouro Preto, 875
Ouse, river, 171, 180 ; as boundary, 162
Ovalu Island, 653
Ovampo people, 1013
Ovens river, 602
Overysel, 222
Oviedo, 374, 376
Ovifak (Uifak), 1041
Ovis Poli, 403
Owari, 552
O-Wassa mountain, 953
Owen Stanley range, 635
Owhyhee (Hawaii), 661
Oxford, 177
Oxus river, 397, 465
Oyapok river, 883
Ozark Plateau, 752, 753

PACARAIMA Mountains, 879
Pacaya, volcano, 783
Pachitea, 839
Pacific, Islands, 649 ; Ocean, Currents of, 70 ; Ocean, Origin of, 41 ; Ocean, Position of, 61 ; Slope of Siberia, 398 ; Slope of United States, 767–771 ; Tides of, 65 ; Volcanic Area, 425
Padang, 566 ; highlands, 565
Padre Island, Tex., 754
Padua, 363
Pago-pago, island, 654
Pahang, 515
Pahoin people, 959
Päijänne, lake, 392
Paik-u-san, 543
Paisley, 159
Palæarctic region, 87
Palæocrystic Sea, 1029
Palæolithic Ages, 100
Palæozoic Formations, Geological position of, 51
Palapye, 1003
Palatinate, Bavarian, 286
Palatines, 276
Palawan, island, 559
Palembang, 566 ; river, 564
Palenque, 779
Palermo, 365
Palm-oil, in Gold Coast, 964 ; in Ivory Coast, 957 ; in Niger Delta, 968 ; in Nigeria, 970 ; in Sierra Leone, 963
Palma, 377 ; Island, 952
Palmas, Cape, 959
Palmer gold-field, 591, 592
Palmerston, 619
Palms in Egypt, 922
Palmyra island, 658
Palti (Yamdok-tso) lake, 541
Pamirs, 49, 396, 427, 464, 470, 540
Pamlico sound, 718
Pampa, 820 ; region, South America, 815
Pampas, 89, 852 ; territory, 856
Pamplona, 376
Pan Guajaibon, 794
Panama, 828 ; isthmus, 824 ; province, 827 .
Panaro river, 356
Panay Island, 558, 559
Pangani river, 941
Pangkar islands, 514
Panié, Mont, 645
Panikotta, 502
Panjab, 471, 489 ; climate, 476
Panjabi language, 479
Panjim, 502
Panos (people), 869
Pantar islet, 572
Papeete, 657
Papua (New Guinea), 635 ; Gulf of, 636
Papuan people, 637
Papuans, 104, 644

Pará, 873; temperature and rainfall, 819
Paraguassu river, 875
Paraguay, 859–862; river, 850, 860
Parahiba, do Norte, 874; river, 874
Parallax, definition, 14
Paramaribo, 882
Paramillo, 824
Paramos in Andes, 826
Paraná, 854; State, 876; river, 850, 860, 874, 876
Paranaguá, 876
Paranapanema river, 876
Paraguaná peninsula, 886
Pardo river, 875
Pare, mountain, 941
Paria, lake, 840
Parima, Point, 834
Paris, 246, 250; longitude of, 31; Tertiary Basin, 235, 236
Parit Jawa, 515
Park, Mungo, Explorer, 900
Parks in Rocky Mountains, 763
Parnahyba river, 874
Parnassus, 345
Parnkalla language, 584
Paros, island, 349
Parramatta, 600
Parry, Sir Edward, Arctic Voyage, 1027
Parsi, people, 479
Pasir, 568
Pass, definition, 50
Passes of the Mississippi, 749
Pastaza river, 830
Pasterze glacier, 304
Pasto, mountain, 824
Patagonia, 850; Pampa Area, 815
Patagonian, people, 822; platform, 45
Patani, State, 509
Patmos, island, 444
Patna, 487
Patos, lake, 877
Patras, 349
Patzcuaro, lake, 776
Pau, 252
Pauillac, 252
Paumotu Island Chain, 651, 657
Paute, river, 830
Pavia, 363
Pavlovsk, 411
Payer, Lieutenant, 1030; Arctic Voyage, 1029
Pays de Caux, 250
Paysandú, 857, 859
Payta, 837
Peace river, 681, 698
Peak, district of Derbyshire, 168; of Tenerife (Pico de Teyde), 952
Pearl river, 535
Peary, Mr. R. E., Arctic explorer, 1032
Pechili, 531
Pechora river, 399
Pecos river, 759
Pedro Cays, 805
Pedrotalagalla, 504
Peel, 186; river, 600
Pegnitz river, 286
Pegu, 496
Pei-ho (Southern) river, 531, 535
Peipus, 128; Lake, 393
Pekan, 515
Peking, 531; climate, 526
Pelagic, definition, 90; deposits, 64; fauna, origin of, 95
Pelasgians, 107
Pelée, Mont, 809
Peleponnesus, 348
Pelew islands, 655
Peloritanian mountains, 358
Pelvoux, Mont, 237
Pemba Island, 939
Pembroke, 164
Penang, 513
Penck, Prof. A, 48; Austria, 302; Austria-Hungary, 298 Bosnia and Herzegovina, 324
Pendactylon mountain, 445
Peneplain, definition, 58, 59
Peniche peninsula, 379
Peninsula, Cape, 985
Pennine Alps, 258; Chain, 163, 168
Pennsylvania, 718, 727, 733
Penobscot river, 723
Pentapolis, 917
Pentland Firth, 155; Hills, 157
Penrhyn island, 658
Penzance, 167
Pepper in Sumatra, 566
Pera, 342
Peradeniya, 506
Perak, 514
Perdu, Mont, 371
Perihelion, 72
Peripli=Compass Charts, 26
Perim island, 452, 455
Perm, 414
Permian Formation, Geological position of, 51
Pernambuco, 874
Persia, 457–463; Telegraph map, 462
Persian Gulf, Origin of, 41
Perth, 157; county, 156, 157; W.A., 625; W.A., Temperature and Rainfall, 580
Peru, 834–840; railways, map, 837
Perugia, 364
Pescadores islands, 553
Peschel, Otto, geographer, 12
Peshawar, 467, 490
Pest, 321
Pet, Arctic Voyage, 1025
Peten, lake, 785; plain, 783, 786
Peter Botte mountain, 1021
Peter's Island, 807
Peterborough, 178
Peterhead, 156
Peterhof, 411
Petermann, Land, 1044; Peak, 1040
Petherick, Edward A.—New South Wales, 593; South Australia, 614; Victoria, 602
Petit Codiac river, 689
Petriu, 508
Petrokow, 405
Petroleum in Caucasus, 416; in Pennsylvania, 733
Petropolis, 875
Peulh people, 956
Peunong tribe, 518
Pevensey, 181
Pezo da Régua, 381
Pfeil, Graf von—German East Africa, 940; German New Guinea, 639; German South-West Africa, 1012; German West Africa, 972; Kiau-chou, 538; Marshall Islands, 654
Phanar, 342
Philadelphia, Pa., 715, 720, 730; Anatolia, 443
Philippeville, 912
Philippine islands, 558–559
Philippopolis, 339
Philippson, Dr. A.—Danubian and Balkan States, 327–351
Phillip, Governor, 597
Phipps, Arctic voyage, 1027
Phlegræan fields, 357
Phœnician colonies, 118, 917
Phosphate in Algeria, 908; in Florida, 747; in Redonda, 807
Phu-lang-thuong, 520
Physical Geography, definition, 3
Physiography, definition, 2
Phyto-Geographical regions, 88
Piacenza, 363
Piauhi, 874
Pichincha, mountain, 830; province, 833
Pico de Peñalara, 369; de Teyde, 952; de Vara Mountain, 384; del Turguino, 794; Island, 384; Mountain, 384; Ruivo, 384
Picos de Europa (Torre de Cerredo), 371
Pictou Harbour, 686
Picts, people, 144, 153
Piedmont, 355, 363
Pietermaritzburg, 994
Pilatus, mountain, 258
Pilcomayo river, 841, 850
Pile-dwellings, Lacustrine, 101
Pillars of Hercules, 378
Pillau, 294
Pilot Knob, Mo., 753
Pilsen, 308
Pinar del Rio, 797; province, 795
Pindus, district, 348; range, 345
Pine-apples, in Cuba, 797
Pine, Creek, 619; forests of Gulf States, 745; ridges, 786
Pinega river, 399
Pines, Isle of, Cuba, 794; New Caledonia, 644
Pinzon, Vicente Janez, Discoverer, 870
Piræus, 348
Piranhas river, 874
Pisa, 361, 364
Pisco, 838
Pitcairn island, 659
Pitch lake, Trinidad, 811
Piton, de la Fournaise, 1024; de la Rivière Noire, 1021; des Neiges, 1024
Pitons, mountains, 809
Pitt river, 767
Pittsburg, Pa., 734
Piura, 837
Piz Kesch, 259
Pizarro in Peru, 836
Placentia Bay, 705
Plains, Kinds of, 49
Plankton, definition, 90
Plans, 28
Plants and Animals, Distribution of, 83
Plateau, definition, 49
Plate river, 857
Platte river, 758, 759
Platten lake, 318
Playa, 800
Playas, definition, 766
Playfair, Sir R. Lambert—Aden, 454; Algeria, 906; Cyprus, 445;

Gibraltar, 378–379; Malta, 366, 367; Marocco, 904; Perim, 455
Plaza Almanzor mountain, 369
Pleffer on Shore fauna, 91
Pleisse river, 291
Pleistocene Formation, Geological position of, 51
Plenty, Bay of, 627
Plevna, 339
Pliocene Formation, Geological position of, 51
Ploesci, 329
Plutonic rocks, 52
Plymouth, 167; Mass., 722, 726; Montserrat, 808
Po, River, 355, 363; Valley of, 125
Podgoritza, 337
Podolian plateau, 311, 312
Poik river, 303
Poitiers, 252
Poitou, Strait of, 235
Pokomo people, 933
Pola, 315
Poland, 276, 300, 313, 412; History of, 136
Polar Eddy, Atmospheric, 81
Polar Regions, The, 1025–1052; Regions, Climates of, 81
Polarity, 3
Polders, definition, 217; at Amsterdam, 222
Poles of Earth, definition, 15
Poles, people, 312; in Germany, 276
Political Geography, 109–121; definition, 5
Polino, Monte, 357
Polynesia, Origin of, 41; Southern, 656
Pomaks, 343
Pomarão, 381
Pomaria, 912
Pomerania, 294
Pomeroon river, 879
Pomona island, 155
Pompeii, 365
Pomponius Mela, Map of, 8
Ponapi Island, 655
Ponce, 800; de Leon, 798
Pondicherry, 503
Pondo people, 990
Pondoland, 992
Pongo de Manseriche, 835; people, 959
Ponta Delgada, 384
Pontevedra, 376
Pontianak, 568
Pontic Coast range, 439
Ponupo, 797
Ponza, island, 353
Poona, 492
Poopo lake, 840
Popocatepetl, mountain, 775
Population, maps, 34; of Asia, 435; of the World, 108
Porta Westfalica, 289
Portas do Rodam, 381
Port, Adelaide, 619; Albert, 602; Antonio, 804; Arthur, 409, 419, 539; -au-Prince, 802; Augusta, S.A., 614, 619; aux Basques, 707; Blair, 500; Chalmers, 628; Curtis, 588; 592; Darwin, 619; Darwin, (Falkland), 864; Darwin, temperature and rainfall, 580; Dickson, 515; Elizabeth, 985, 991, 992; Essington, 619; Fairy, 609; Jackson, 599; Lincoln, S.A., 614, 619; Louis, Mauritius, 1022; Melbourne, 608; Moresby, 636, 638; Natal, 995; Nicholson, 627; of Spain, 812; Phillip, 585, 602; Phillip, map, 608; Pirie, 619; Royal, 804; Said, 927; Simpson, 697; Victoria, Seychelles, 1023; Weld, 514
Portage la Prairie, 690
Portages, 690
Portland, 177; Bay, 605; District, 603; Me., 723; Ore., 769; Victoria, 609
Porto, Alegre, 877; Grande, 980; Rico, 798–801; Santo Island, 384
Portrush, 193
Portsmouth, 181; Dominica, 807; N.H., 723
Portugal, 379–385; Origin of, 135
Portuguesa river, 885
Portuguese, Colonies, Statistics, 385; East Africa, 944–946; Guinea, 980–981; India, 502–503; Timor, 573; West Africa, 979–984; in Africa, 900; in East Africa, 937
Posen, 292, 298
Position, Determination of, 18
Post-Tertiary = Quaternary, 51
Potatoes in Germany, 280
Poti, 416
Potomac river, 718, 729
Potosi mines, 820, 842
Potteries, The, 175
Poty river, 874
Poughkeepsie, N.Y., 736
Powell in Antarctic, 1048
Poyang Lake, 524, 530, 533
Pozsony (Pressburg), 322; basin, 316
Pozzuoli, 364
Pra river, 963
Praga, Poland, 412
Prague (Prag, Praha), 308
Praia, 980
Prairie, as a misnomer, 757; Steppe, 695
Prairies, 89, 673; and population, 737; and trees, 739
Praslin island, 1023
Prayag, 488
Prealpi, 126
Precipitation, 76
Pregel river, 294
Prehistoric Age, 101
Presidios, 377
Pressburg, 322
Preston, 173
Pretoria, 1011
Pribilof Islands, 770
Prince, Charles Foreland, 1044; Edward Island, 687; of Wales' Island, 513; Rupert's Town, 807
Princes island, 981
Princess Royal Harbour, 620, 625
Princeton, mountain, 760
Principe (Princes) island, 981
Pripet river, 313, 390
Prisrend, 343
Progreso, 781
Projection for maps, 20–23
Propontis, 330
Provence, 239
Providence, R.I., 723, 726
Province, of South Australia, 614; Wellesley, 513
Provincetown, Mass., 726
Provincial Districts in New Zealand, 634
Prusa, 444
Prussia, 278, 293
Prussians, 275
Pruth river, 313, 327, 329
Przemysl, 313
Przhevalski, Col., explorer, 540
Przibram, 307
Pskov, Lake, 393
Ptolemais, 916
Ptolemy, 26, 584; Editions of, 11; Maps of, 9
Puerh tea, 535
Puerto, Barrios, 788; Cabello, 887; Colombia, 828; Cortez, 788; Limon, 788; Montt, 848; Plata, 802; Prado, 839; Principe Province, 795; Real de Cabo Rojo, 800; Villamizar, 886
Puget sound, 768
Pulkova, Longitude of, 31
Pulkovo, 411
Pulo Pertja, 565
Pulque, 778
Puma in Chile, 845
Puna, definition, 834; island, 831; region, 821
Pungwe river, 945, 998, 1002
Punjab, *see* Panjab
Puno, 836, 839
Punta, Arenas, Chile, 848; Arenas (Costa Rica), 788; Gallinas, 813; Pariña, 813
Purace, mountain 825
Purari river, 636
Pygmies in East Africa, 934
Pyramids of Ghizeh, 924
Pyramus river, 440
Pyrenean-Cantabrian mountains, 369; Region of France, 235
Pyrenees, 235, 237, 371; Relative extent of, 396; ranges, Brazil, 874; Victoria, 602
Pytheas, 143; explorations, 8; Voyage of, 1025

QUANG-TRI (Kwang-tri) 517
Quarnero, Gulf, 323
Quartzite, 52
Quaternary Formations, Geological position of, 51
Quathlamba mountains, 1007
Quebec, city, 692; province, 689–692
Quechuan people, 107
Queen, Charlotte sound, 697; Victoria desert, 622
Queen's channel, 614
Queenborough, 152
Queensclift, 609
Queensland, 587
Queenstown, 194
Queguay river, 857
Quelimane branch, 945
Quelpart, 543
Queretaro, 780
Quetta, 466, 499
Quetzal, 786
Quezaltenango, 785, 789
Quezaltepeque, volcano, 784
Quiche, 787
Quichua, in Bolivia, 841; language in Ecuador, 832; language in Peru, 836; people, 822

Quincy, Ill., 744
Quindiu pass, 826
Quirinal, The, 364
Quito, 833; basin, 830; temperature and rainfall, 819

RABAT, 905
Rabba, 972
Rabbit-proof fences of New South Wales, map, 595
Rábcza river, 316
Races of mankind, 102; in Africa, map, 897; of the world, 108
Radak, atolls, 654
Rae, Dr. John, Arctic Exploration, 1028
Rafai, 959
Raffles Bay, 619
Raffles, Sir Stamford and Singapore, 512
Ragatz, 263
Ragged Island, 803
Railways in Africa, map, 902; in Argentina, map, 853; of Australia, map, 585; of Belgium, map, 227; of Britain, map, 185; of China, 531; of Cuba, map, 797; of Europe, 137; of France, 246, 247; of India, map, 485; of New Zealand, map, 633; of North America, map, 677; of Peru, map, 837; on the Prairies, 738; of Victoria, 609
Rainfall, 76; Influence of Mountains on, 785; of Africa, 894; map of Australia, 580; of Europe, map, 130; of India, maps, 475; of South America, 818
Rainier, Mount, 767
Raipur, 493
Raised-beaches, 39; Scotland, 153
Rajputana, 496
Rakan river, 564
Raleigh, N.C., site, 720
Rälik, atolls, 654
Ralum, 641
Rameswaram islands, 504
Ramsay, 186
Ramsgate, 181
Ramu river, 639
Ranau, 566; lake, 564
Rand, Transvaal, map, 1009
Rangoon, 496
Rannoch, Loch, 156
Rapa Nui island, 659
Raratonga islands, 656
Ras el-Hadd, 452
Ras Kasar, 935
Ratisbon, 285
Raveneau, Prof. L.—General Geography of France, 239–255
Ravenna, 363
Ravenstein, E. G.—Maps and Map Reading, 26
Ravenswood gold-field, 592
Ravi river, 490
Rawalpindi, 490
Rawlinson mountains, New Guinea, 639
Razorback, Mount, 614
Reaction Currents, 67
Reading, 179
Rebmann, Explorer, 900
Recent Formation, Geological position of, 51
Recife, 875
Reclus, Elisée, 12
Red, Basin of China, 522, 532, 534; Clay, 65; River of the North, 696, 750, River Rafts, 754; River Settlement, 696; River of Tongking, 516; Sea, circulation of, 64, 66; Sea Hills, 929
Redjang river, 567
Redon, 251
Rednitz river, 285
Redonda island, 807
Re-entrant = incurve of the coast, 668
Reeves, Hon. W. P.—New Zealand, 627
Regel, Dr. Fritz, Colombia, 824
Regensburg (Ratisbon), 285
Regina, 702
Reichenberg, 308
Reims, 245, 249
Reindeer in Arctic, 1039
Reka river, 303
Relict mountains, 55
Relief maps, 34
Religion in Germany, 278
Religions of Asia, 437; of Switzerland, map, 261
Reloncaví, Gulf, 848
Remscheid, 288
Renfrew, 159
Renmark, 618
Rennell island, 648
Rennes, 251
Reno, river, 356
Republica, May or de Centroamerica, 787; Oriental del Uruguay, 856
Reservoir on the Nile, 922
Rethymnon, 350
Réunion, 1024
Reuss, 290; river, 258
Rewah, 497
Reykjavik, 215
Rhat, 918
Rhætic Formation, geological position of, 51
Rheingau, 287
Rhine, Highlands, 268, 287; Province, 294; river, 216, 257, 270, 285; valley of, 125
Rhodanian depression, 236
Rhode Island, 723
Rhodes, island, 444
Rhodesia, 997
Rhodope, 338; mountains, 332, 340
Rhön mountain, 288
Rhondda valley, 165
Rhone, river, 245, 258; valley, 57, 125
Ria, definition, 50
Riam-Kina river, 568
Ribble, river, 173; valley, 168
Rice, in India, 484; in Indo-China, 518; in Siam, 510
Richardson, Dr., Explorer, 901; Sir John, Arctic voyage, 1028
Richmond, Va., site, 720
Rideau Canal, 695
Riesengebirge (Giant's Mountains), 267, 292
Rift-valleys, 53; of East Africa, map, 930
Riga, 409, 411
Righi, mountain, 258
Rikuchu, 547
Rikuzen, 547, 553
Rilodagh mountain, 332, 338
Rimac river, 838
Rimini, 364
Rinjani mountain, 572
Rio, Chico, 887: Chixoy, 783; del Rey, 974; Grande, 754, 762, 774, 776, 841; Grande do Norte, State, 874; Grande do Sul, 877; Negro, 816, 850, 857, 884; Negro territory, 856; Patia, 824; Tinto, 374; Tocuyo, 886; de Janeiro, 871, 875, 876; de Janeiro, longitude of, 31; de Janeiro, rainfall and temperature, 868; de Oro, 953; de la Pasion, 785; de la Plata Countries, 849–862; de las Balsas (Mescala), 776
Riobamba, 830, 833
Rion river, 395
Riow islands, 565, 566
Risdon, 612
Ritter, Karl, 12
Riva, 306
Rivas (Nicaragua), 783
River, Capture, 55, 59; Terraces, 55, 56; Work—Constructive, 56; Work—Destructive, 55
Rivers, and Boundaries, 112; and Canals of France, 245; Classification of, 58; of North German Plain (map), 271; use of, 111
Riverina district, 594
Rivières du Sud, 957
Road Town, 807
Roads, in Algeria, 911; in China, 531; Roman, 133
Roanne, 245
Roaring forties in New Zealand, 630
Roatan island, 784
Robertson, Sir G. S.—Afghanistan, 464
Roblet, Père D., 1015
Roca, Cape da, 379
Rochdale, 173
Rochefort, 252
Rochester, N.Y., 736
Rockhampton, 592
Rockport, Mass., 722
Rocks, Order of the, 51; Sedimentary, 51; and Weathering, 51
Rocky Mountains, 671, 697, 760–767
Rode Bay, 808
Rodriguez, 1023
Rodway, J.—Colonies of Guiana, 878; Haïti and Santo Domingo, 801; West Indian Colonies, 803; West Indies, 791
Roebuck Bay, 625
Rofia fibre, 1019
Rogachev, 390
Rokel river, 962
Rollers, 67
Roman Roads, 133
Romans in Britain, 144; in Europe, 133; in Spain, 372
Romanshorn, 263
Rome, 364; Influence of, 133; longitude of, 31
Römerbad, 306
Romney Marsh, 181
Rönne, 211
Roon, 644
Roper river, 615
Roralma, mountain, 879, 884
Röros, 205
Rosa, Monte, 126, 258
Roseau, 807
Roses in Bulgaria, 339; in European Turkey, 341

Rosetta mouth, 921
Ross and Cromarty, 155
Ross, Sir James Clark, 60; Arctic voyage, 1028; Sir James Clark, in Antarctic, 1048
Ross, Sir John, Arctic voyage, 1027
Rossland, B.C., 116, 700
Rostov, 416
Rotation, 14; of Earth, Effects of, 56, 68, 72, 76, 78
Rotoava, 657
Rotterdam, 223
Rotti, 572
Rotuma island, 652
Roubaix, 249
Rouen, 245, 250
Rovuma river, 941
Roxburgh, county, 160
Roy, General, 29
Royal Geographical Society, Rules for Orthography, 33
Royal Niger Company, 969
Royat, 252
Rubies in Burma, 474
Ruapehu mountain, 628
Rüdersdorf, 269
Rudolf, Lake, 931
Rudolstadt, 290
Ruelle, 245
Ruenya river, 998
Rufiji river, 892
Rufiji-Ruaha river, 941
Rufisque, 956
Rügen, 275, 269
Ruhr, Coal-field, 288; valley, 282
Ruiz mountain, 825
Rukwa (Rikwa) Lake, 942, 947
Rum Cay, 803
Rum in Jamaica, 804
Rumania, 327–330
Rumanians, 320
Rumbi mountains, 965
Rupel, river, 225
Rushchuk, 339
Russia, Lake region of, 388; Density of population, map, 404; Railway map, 419
Russian, Empire, 386–421; Climate of, 401; Map of Resources, 406; Plain, 388
Russell island, 648
Ruthenians, 312, 313
Rutherglen, Victoria, 609
Ruwenzori mountain, 891, 931
Rye, seaport, 181

SAALE river, 290
Saba island, 806
Sabæans, 447, 453; in South Africa, 1001
Sabaki river, 931
Sabanilla, 828
Sabi river, 998
Sable Island, 686
Sabrata (Zuara), 917
Saco, Me., 725; river, 725
Sacramento, 768; river, 767
Sacsahuaman, hill, 839
Sado river, 380, 381
Safed Koh, mountains, 466
Safi, 905
Safid-rud river, 458
Safra, 453
Sage brush, 764, 766
Sagua, 798; la Grande, 797
Sahara, 953; climate, 894; in Algeria, 907; in Tunisia, 913
Saharan Oases, 905
Sahel in Tunisia, 913
Sahyadri (Ghats), 471
Saigon, 520
Saihut, 455
Saikyo, 552
Saima, Lake, 392
St., Andrews, 158; Anthony, 743; Antony, Cape Verdes, 979; Benoit, 1024; Christopher's Island, 807, 808; Clair, Lake, Tasmania, 611; Canzian, caves, 303; Catherine, Mount, 810; Croix island, 805; Denis, 250; Denis, Réunion, 1024; Elias Alps, 671; Elias, Mount, 672, 681, 770; Etienne, 245, 253; Eustatius island, 806; François Mountains, 753; Gall, Canton, 263; George, mouth of Danube, 328; Georges, Grenada, 810; Gilles, 228; Gothard mountains, 258; Gothard Pass, 127; Gothard railway (map), 262; Helena Island, 1013; Helena (map), 1014; Helena, Moreton Bay, 592; Helens, 173; Helens, Mount, 767; John, N.B., 689; John island, 805; John river, 688, 689; John's, Antigua, 807; John's, Newfoundland, 707; Josse-ten-Noode, 228; Kitt's Island, 807, 808; Lawrence, Gulf of, 679; Lawrence Plain, in Ontario, 693; Lawrence Plain, in Quebec, 690; Lawrence river, 681, 689, 728; Lawrence river navigation, 684; Lawrence river system, 665; Lazarus Islands, 558; Leonards, 181; Louis-Dakar railway map, 956; Louis, French Guiana, 883; Louis, Miss., 749; Louis, Senegal, 957; Louis, Miss., site, map, 751; Lucia, 809; Malo, 251; Martin's island, 806; Mary's Bay, 705; Moritz, 263; Nazaire, 251; Ouen, 250; Paul islet, 1024; Paul, Liberia, 959; Paul, Minn., 743; Petersburg, 410; Pierre, 708, 809; Pierre-les-Calais, 249; Pierre and Miquelon, 707–708; Pierre, Réunion, 1024; Quentin, 249; Thomas, Island, 805; Thomas Island, West Africa, 981; Vincent, Cape, 380; Vincent, Cape Verdes, 979; Vincent Gulf, 614; Vincent, W.I., 810
Ste. Croix, 264
Saisi river, 947
Sajama mountain, 840
Sakai, people, 510, 512
Sakalava people, 1018
Sakaria (Sangarius) river, 440
Sakhalin, island, 399
Sakkar, 491
Sal island, 979
Sal (timber) in India, 476
Sala, 203
Salaga, 964
Salama, rainfall, 785
Salamanca, 376
Salaier island, 569
Salaverry, 837
Salawati, 644
Salazie, 1024
Saldanha bay, 985
Sale, Victoria, 609
Salem, 495: Mass., 722, 725
Salerno, 359, 365
Salford, 172
Salgir, river, 394
Salisbury, 179; Plain, 179; Rhodesia, 1002
Salish people, 684
Salinity, and Circulation, 67; of Oceans, 63
Sallee (S'la), 905
Salmon in British Columbia, 699
Salonica, 343
Salt, in Bahama, 803; in Cuba, 797; in Eritrea, 935; in Germany, 282; in India, 474
Salt Cay, 805; Island, 807; Lake City, 767; Lakes, origin of, 63; lakes, position, 49; Lakes of Tunisia, 914; range, Panjab, 472
Salta, 855
Salto, 857, 858, 859
Saltwater river, 608
Salvador, 789; physical geography, 783; seaports, 788
Salzach river, 303, 305
Salzburg, 305; duchy, 304; valley, 306
Salzkammergut, 306
Samang, people, 510, 512
Samar, 559
Samara, 390, 418
Samarai, 636, 638
Samarang, 563
Samaria, 449
Samarcand, 409, 417; province, 395
Samoa, 653
Samos island, 444
Samoyeds, 403
Samsûn (Amisus), 443
San river, 391
San, Blas, 781; Blas mountains, 824; Cristobal, 886; Christoval island, 648; Diego, Cal., 768; Domingo, 381, 802; Fernando, 812; Fernando de Apure, 885; Francisco, Cal., 675, 715, 768, 769; Francisco mountain, 763; German, 800; Jose (Guatemala), 788; José (Uruguay), 859; José river, 857; José de Costa Rica, 789; Juan, Argentina, 855; Juan, Porto Rico, 800; Juan, Rio, 824; Juan river, 784, 785, 850; Juan del Norte (Greytown), 788; Juan del Sur, 788; Luis, 855; Luis de Apra, 656; Luis Valley, 762; Miguel, 789; Miguel de Piura, 837; Miguel volcano, 784; Pablo lake, 830; Salvador, 783, 789; Sebastian, 376; Vicente, 789
Sanaa, 454
Sand, dunes, 57; in Central Asia, 431, 540; in Africa, 895; hills in Nebraska, 758
Sandakan, 560
Sanderson's Hope, 1026
Sandhurst, 608
Sandstones, 52
Sandwich Islands (Hawaii), 660
Sangai mountain, 830
Sangarius river, 440
Sanghir islands, 569
Sangke river, 509
Sannaga river, 974

Sannikoff land, 1046
Sanpu river, 471
Santa, Ana, 789; Ana, volcano, 784; Catharina, 876; Clara, province, 795; Cruz, 647; Cruz, Tenerife, 952; Cruz de la Sierra, 842; Cruz de Mar Pequeña, 953; Cruz Island, 806; Cruz river, 850; Cruz territory, 856; Fé, 854; Isabel, 953; Isabel mountain, 825, 953; -Lucia hill, 847; Lucia river, 857; Luzia Island, 970; Maria, island, 384; Martha mountains, Brazil, 874; river, 835; Rosa, 859
Santander, 376, 827, 828
Santani Lake, 643
Santarem, 873
Santiago (Argentina), 855; province, 795; river, 776; Cape Verdes, 979; de Chile, 847; de Chile, longitude of, 31; de Cuba, 796, 798; de Cuba, climate, 795; del Estero, 855; de Compostela, 376
Santo Antão (St. Antony), 979; Antonio, 981; Domingo, republic, 802
Santorin (map), 349
Santos, 876
Sanyati river, 999
Sauerland, 287
Saugor, 493
São, Francisco river, 866, 875; Luiz, 874; Marcos Bay, 874; Nicolão island, 979; Paulo, 870, 876; Paulo de Loanda, 984; Roque, Cape, 874; Salvador da Bahia, 875; Salvador do Congo, 983; Thiago (Santiago) Island, 979; Thomé (St. Thomas) island, 981; Vicente, 870; Vicente, Cape (Cape St. Vicente), 380; Vicente (St. Vincent), 979
Saône river, 236; and Rhone, valley of, 125
Saparua island, 571
Sapper, Dr. Carl—Central America, 782
Sapote forests of Yucatan, 778
Saracens and the Crusades, 134; in Africa, 900
Sarajevo, 324
Saramacca river, 882
Saratov, 414
Sarawak, 560
Sardinia, 358, 364
Sarjektjokko, mountain, 198
Sarrakole people, 956
Sarstoon river, 789
Sarus river, 440
Saskatchewan, 702; district, 701; -Nelson river, 681; river, 701; river navigation, 685
Sassak people, 572
Sassandra river, 957
Sassari, 365
Sassnitz, 203
Sasuto language, 1003
Satlaj river, 471
Satpura range, 471
Sault St. Marie, 692, 735
Saxon Switzerland, 291, 307
Saxons, 144; in Germany, 276; in Holland, 220
Saxony, kingdom, 291; province, 290, 294
Savannas, 89; in Angola, 983; in Africa, 896; in Asia, 433; in Brazil, 820, 868, 874; in Central America, 786; in Colombia, 825; of Venezuela, 884
Savannah, Ga., site, 720
Save river, 303, 945
Savoy, 241
Savu islet, 572
Sawatch mountains, 760
Sayan mountains, 398, 400
Sbeitla (Suffetula), 915
Scafell Pike, 163
Scandinavia, 197–211; Geology of, 128; highland region of, 124
Scandinavian peninsula, 197–202
Scandinavians, 108
Scania, 203, 204
Scarboro' Heights, Ont., 695
Scarborough, 177; Tobago, 812
Scarp, definition 49
Scenery, dependent on nature of rocks, 52
Schaerbeek, 228
Schaffhausen, Canton, 263
Schaumburg-Lippe, principality, 289
Schelde river, 224, 229
Schenectady, N.Y., 736
Schiedam, 223
Schist, 51
Schlesien, Germany, 292; Austria, 308
Schleswig, 294; duchy, 209
Schneekoppe, 267, 306
Schollengebirge = crust - block mountains, 53
Schollenland, definition, 268
Schuylkill, 730
Schwarzburg - Rudolstadt, 290; -Sondershausen, 290
Schweinfurth, Explorer, 901
Schweiz (Switzerland), 256
Schwerin, 293
Schwyz, Alps of, 258; canton, 263
Scilly islands, 167
Scirocco wind, 314
Sclater, Dr. P. L., Zoological regions, 87
Scoresby, expl., 1027; Fjord, 1041
Scotia, ship, 1048
Scotland, 152–161; Earliest people of, 101; raised beaches in, 39, 153
Scots, 153; of Ireland, 190
Scott, Capt. R. F., explorer, 1048
Scottish Coal-fields, 150; Highlands, rainfall of, 142
Scratchley, Mount, 635
Scree, definition, 57
Scugog, Lake, 694
Scutari, 342, 343; Lake, 337
Scythians, 479
Sea, Island cotton, 720; -level, 46; -level, changes in, 39; -level, uncertainty of, 39; -lochs, definition, 50; Mountains (Serras do Mar) of Brazil, 866; -water, 63
Seaports of United Kingdom, 150
Seasons, 72; cause of, 23
Seattle, 769
Sebang-hien, 517
Sebastea, 444
Sebbe, 973
Sebekar bay, 642
Sebele's Country, 1003
Sechuana language, 1003
Sechwan, 525, 534
Sedan, 245
Sedeir district, 456
Sedimentary rocks, 51
Sediments, 51
Seeland, 210
Segovia, 376, 784
Segre river, 370
Seihun, river, 397
Seine river, 235, 246, 25c
Seistan swamps, 466
Sekar, 644
Selangor, 514
Selaru island, 573
Sele, river, 356
Selenga river, 400
Seliger, lake, 390
Selizharovka river, 390
Seljûk Turks, 441
Selkirk, county, 160; Mountains, B.C., 671, 698
Selous, F. C.—Southern Rhodesia and Bechuanaland, 997
Selvagens, island, 384
Selvas, 820; in Brazil, 868; in Colombia, 825; Venezuela, 885
Semeni river, 333
Semien mountain, 934
Semites, 107; in Africa, 897
Semmering Pass, 305
Sendai, 553; Bay of, 547
Senegal, 956; river, 892, 955
Senegambia, 958
Senga people, 945
Senne, river, 228
Senussi Arabs, 916, 928
Sentis mountains, 258
Seoul, 544
Septimer pass, 127
Seraing, 229
Serang island, 570
Serchio river, 356
Seremban, 514
Serere, people, 956
Seres, 343
Sereth, river, 327
Sergipe, 875
Seri tribe, 779
Seringapatam, 498
Serra, Central of Brazil, 866; Geral, 866; Morumbala, 945; d'Urbion, 380; da Arrabida, 380; da Estrella, 381; da Gorongoza, 945; da Gralheira, 379; de Cintra, 379; de Grandola 380; do Mar, 866, 875, 876
Serrano, 570
Serras do Bouro, 379
Sert, Gulf of, 916
Servia, 335–337
Servians, 334
Serwatty islands, 573
Setif, 912
Sete Quedas falls, 860
Seto, 553
Setubal, 381, 384
Sevastopol, 409, 416; rainfall and temperature of, 401
Seven Islands, 1044
Sever river, 381
Severn tunnel, 166; valley, 165
Sevenoaks, 130
Seville, 376
Sèvres, 245, 250
Sextant, 11, 16
Seybus river, 908
Seychelles, 1023; structure of, 41
Seymour Narrows, 697

Sfax, 915
s' Gravenhage, 223
Shackerley Mountains, 807
Shahi lake (Urumiya), 463
Shahjehanpur, 489
Shale, 52
Shamo, desert, 539
Shan States, 518
Shanghai, 531, 533
Shanhaikwan, 531
Shannon, river, 189
Shansi, 525, 532
Shantung, 532, 538
Shari river, 892, 974
Shark Bay, 578
Shashi river, 998
Shasi, 534
Shasta, Mount, 768
Shatt-el-Arab, river, 447
Sheep in Algeria, 910; in Argentina, 853; in Australia, 586; in the Falklands, 863; in Transvaal, 1008
Sheet-flood, definition, 766
Sheffield, 170
Shelif river, 908
Shelon, river, 393
Shenandoah valley, 728, 747
Shengking, 538
Shensi, 532
Sherbro river, 962
Sherbrooke, Canada, 692
Sherwood Forest, 171
Shetland, 155
Shibam, 455
Shickshocks mountains, 690
Shiel, Loch, 155
Shihite Mohammedans, 460
Shikarpur, 491
Shikoku, 546
Shilka river, 400
Shillong, 495
Shinana-gawa, river, 547
Shinshu, 547
Shiraz, 463
Shire river, 945, 947
Shires, definition of, 162
Shoan people, 933
Sholapur, 492
Shoshonean people, 106
Shotts of Algeria, 908
Shreveport, 754
Shrewsbury, 164
Shuri, 553
Si-Kiang river, 524, 530, 535
Siam, 508–511
Siang river, 525, 530
Siangtan, 533
Siao-ho river, 534
Sib-Song-Panna, 519
Siberia, 388, 1045; configuration, 387
Siberian railway (map), 418
Sibree, Rev. James—Madagascar, 1015
Sicily, 353, 358, 364
Sidi Bel Abbes, 912
Sidlaw Hills, 157
Sidon, 450
Sidra, Gulf of, 889
Siebengebirge (Rhine), 287
Siena, 364
Sierra, Leone, 962–963; Leone, origin, 960; Luquillo, 798; Luquillo river, 799; Madre, 672, 775; Maestra, 794, 797; Maraguaca, 884; Morena, 369; Nevada, 672; Nevada (Spain), 370; Nevada of California, 767; Nevada de Cocui, 825; Nevada de Merida, 886; Nevada de Santa Marta, 825; Parima, 884; de Amambay, 860; de Bejar, 373; de Gredos, 369; de Guadarrama, 369; de Mbaracayú, 860; de Perijá, 886; de Toledo, 369; de Las Minas, 783; de los Organos, Cuba, 794, 796; del Mico, 783
Sievers, Dr. W.—Venezuela, 884
Sigilmassa, 906
Sihanaka people, 1018
Sihûn (Sarus) river, 440
Sikasso plateau, 955
Sikhota-Alin range, 399
Sikhs, 481
Sila, 357
Sileraki, 644
Silesia (Schlesien), 292, 293, 308
Silistria, 339
Silk, in China, 527, 529; in Japan, 551
Silla de Carácas, mountain, 887
Silurian Formation, Geological position of, 51
Silver, in Bolivia, 842; in British Columbia, 699; in Mexico, 780; in New South Wales, 601; in Peru, 836
Silverton, 601
Simbirsk, 390
Simbor, 502
S mcoe, Lake, 694
Simon's Bay, 985
Simplon, 265; Pass, 127; Tunnel, 262
Simpson, T., Arctic Explorer, 1028
Simûm, 456
Sinai peninsula, 919, 923, 929
Sindh, 471, 490; -Pishin railway, 499
Singapore, 513
Singareni, 497
Singan, 532
Sinic formations, 525
Sinkiang, 539
Sinnamarie river, 883
Sinni, river, 357
Sino-Japanese plant region, 433
Sinope, 439
Sintsiang, 539
Sion, 265
Siouan people, 106
Sioux people, 684
Sipan Dagh, mountain, 440
Sirikol mountains, 465
Sisal hemp in Bahama, 803
Sitka, 770
Sittang river, 473
Siva (Siwah), 916, 928
Sivas, 443; (Sebastea), 444
Skagen, 208
Skagerrak, 197
Skaw, 208
Skeena river, 698
Skiddaw, 163
Skjaergaard, 199
Skröe, 644
Skutari (Chrysopolis), 443
Skye, 155
Slate, 52
Slave, States of U.S., map, 747; trade in Africa, 899
Slavery, in Brazil, 871; in United States, 746
Slavonic languages, 132
Slavs, in Balkan Peninsula, 334; in Germany, 276; of Russia, 403, 404
Slesvig, duchy, 209
Slieve Bingian, 193; Bloom, 189; Donard, 193; Felin, 189; Liag, 187
Sligo, 193
Slopes, definition, 50
Smith, Mr. Leigh, Arctic Exploration, 1030; Andrew, Explorer, 900
Smith Sound, 1029, 1035; Sound Region Map, 1029
Smolensk, 390
Smyge Huk 197
Smyrna, 443
Smyth, H. Warington—Siam, 508
Snaefell, 186
Snake river, 764; Canyon, 672
Snow, effect of, on Climate, 76; -line on Alps, 126, 259; -line in Caucasus, 395
Snowdon, 164
Snowy river, 594, 602
Soar, river, 176
Sobat, river, 920
Sobo people, 967
Sobrarbe, valley, 371
Society Islands, 656
Soerabaya, 563
Sofia, 339; basin, 331
Soils and heat, 75; of Ohio region, 738
Sokhondo 398
Sokoto, 969, 971, 972; river, 970
Sokotra, 936
Solar Energy on the Earth, 4; Heat, Distribution of, 72
Solent, 181
Soleure (Solothurn) canton, 264
Solingen, 288
Solo river, 563
Sologne, district, 251
Solomon Islands, 647
Solor islet, 572
Solothurn canton, 264
Solway Firth, 160, 163
Soma, 443
Somali people, 898
Somaliland, 936
Somers' Islands, 709
Söndenfjeldske district, 206
Sondershausen, 290
Sonmiani, 499
Sonnblick mountain, 303
Sonneberg, 290
Sonrhai people, 956
Soo (Sault Ste. Marie) Canal, 735; map, 692
Sorata Mount, 817, 840
Sorong, 644
Sorraia, river, 380
Soufrière, Hill, 808; St. Lucia, 809; St. Vincent, 810
Sound, The, 197, 208, 210
Soundings, 48
South Africa, 985–1014; Company, 950; Geology, 986; Mountain System of, map, 986
South African Republic, 1010
South America, Climate, 818; Continent of, 813–823; Configuration (map), 814; Fauna, 821; Flora, 820; unexplored areas, 12
South, Australia, 614–620; Carolina Islands, 720; Dakota, 751, 757;

Downs, 180; Esk river, Tasmania, 613; Holland, 222; Georgia, 864; Island, N.Z., 627, 629; Perth, 625; Sea Islands, 649; Shields, 170; Shields, port of, 151; Wales Coal-field, 150, 164, 165
Southern, Alps, 627, 628; Coastal Plain of U.S., 745; Continent, hypothetical, 11; Cross, 626; *Cross*, ship, 1048; Hemisphere, 42; Ocean, 1047; Ocean, currents of, 70; Ocean, position of, 61; Ocean, tides of, 65; Rhodesia, 997–1002; Rhodesia and Bechuanaland, 997–1003; Rivers (Rivières du Sud), 957; Uplands of Scotland, 153, 160
Southampton, 181; Port of, 151
Southland, 629
Southport, 174
Spain, 368–378; origin of, 135; and South America, 822
Spalato, 315
Spandau, 294
Spanish in Cuba, 796; Town, 804; Sahara, 953; West Africa, 952–953
Sparta, 349
Speke, Capt., Explorer, 901
Spencer Gulf, 579, 614
Sperrin mountains, 193
Spetsae island, 349
Spey, river, 156
Spezia, 363
Sphakiotes, 350
Sphere of influence, 119
Spice Islands, 570
Spinifex, 622
Spithead, 181
Spitsbergen, 1044; first crossing of, 1032
Spokane, 764
Sponge fishing in Anatolia, 444
Sponges in Bahamas, 803
Spree river, 271, 295
Spurges, 89
Spurn Head, 179
Srinagar, 499
Staaten Land, 632
Staffordshire, 174; Coal-field, 150
Stambul, 342
Stanislau, 312
Stanley, Sir H. M., 12, 901; on Congo, 977
Stanley (Falklands), 864; Falls, 978; Falls province, 978; Mountains, 594; Pool, 959, 978
Stanovoi mountains, 398; Khrebet, 399
Stans Foreland, 1044
Starnberg lake, 272
States, definition, 109
Statistics, use of, 120
Stavanger, 207
Stawell, 609
Stefanie, Lake, 931
Steiermark (Styria), 304
Stereographic projection, 21
Steppe, varieties of, 388; Vegetation, 89
Steppes, of Asia, 432; Government of, 395; of Russia, 402; of Turkestan, 396
Stettin, 294
Stettiner Haff, 270
Stevenson, R. L., on South Sea Islands, 649
Stewart Island, 628, 629
Stikine river, 698
Stirling, 158; Range, 622
Stockholm, site of, 203
Stone rivers of the Falklands, 863
Stonehenge, 179
Stonehouse, 167
Stoney Tunguska river, 426
Store Skagestölstind, 198
Stornoway, 155
Stour, river, 180
Straits Settlements and Malay States, 511–515
Stranja hills, 332
Stranraer, 160
Strassburg, 287
Stratford-on-Avon, 174
Strathmore, 157
Straw Sea, 381
Stream-line, definition, 50
Strigonium, 322
Strike, 59; definition, 55
Strome Ferry, 155
Strömfjord, 1041
Stromö, 211
Strophanthus in British Central Africa, 948
Stroud, 177
Strüb, 210
Strzelecki, Count, 602
Sturt, explorer, 617; explorations by, 596; Creek, 576
Stuttgart, 285
Styria (Steiermark), 304, 305
Suaheli people, 933, 942
Subsequent rivers, definition, 59
Subsidence and elevation, 40
Suchow, 533
Suck, river, 189
Sucre, 842
Suda Bay, 350
Sudan, 897; (French), 958; (Egyptian) provinces, map, 928
Sudbury, 694
Sudetes, 268, 291, 306, 308
Sueira, 905
Suess, Prof. E., 38
Suess, Lake, 931
Suez, 927; Canal, 925, 928; Canal map, 921
Suf, 908
Suffetula, 915
Sugar, in Barbados, 811; in British Guiana, 880; in Cuba, 796; in Fiji, 652; in Germany, 281; in Hawaii, 661; in Jamaica, 804; in Mauritius, 1022; in Porto Rico, 799–800; in Réunion, 1024; -cane Industry, 117
Sugar Loaf Mountain, Ecuador, 825
Suir river, 194
Suisse (Switzerland), 256
Sukhona, river, 391, 399
Sulaiman range, 499
Sulden, 306
Sulina mouth of Danube, 328
Sulitelma, 205
Sulphur in Chile, 844; in Sicily, 354
Sulu islands, 559; people, 567; Sea, 566
Sumao, 535
Sumatra, 564
Sumba, 572
Sumbawa island, 572
Sumida-gawa, river, 552
Sunda, Islands, 561–573; Strait, 563
Sundanese people, 557
Sunderland, 170
Sundswall, 204
Sungari river, 539
Sungei Ujong, 514
Sunk Plain, definition, 49
Sunni Mohammedans, 460
Superior, Lake, 692, 734, 737
Surat, 492
Surghab river, 397
Suriname river, 882
Surma valley, 495
Surinam, 882
Surrey, 181; Jamaica, 804
Surveys, extent of, 12; trigonometrical, 29, 30
Susquehanna river, 731
Sussex, name, 144
Susu people, 956
Sutherlandshire, 148, 155
Suva, 653
Sveaborg, 409, 412
Svealand, 203
Sverdrup, Captain, 1032
Sverige (Sweden), 202
Svir river, 393
Swabians, 276
Swakop river, 1012
Swakopmund, 1012
Swallow-holes, 54
Swan river, 621, 625; Settlement, 624
Swansea, 165
Swaziland, 1010
Sweden, 202–205
Swedish Deep, 1034
Swiss Plateau, 256
Switzerland, 256–265; map of languages, 260; map of religions, 261
Sydney, N.S.W., 599; climate, 594; longitude of, 31; Temperature and Rainfall, 580
Sylhet, 495
Symmetry of land round North Pole, 44
Syme island, 444
Syncline, definition, 53
Syr-daria, province, 395; river, 396
Syra, 349
Syracuse, 365; N.Y., 736
Syria, 448–451
Syrian desert, 449
Syrtes, 889
Syrtis major, 916
Syzran, 390
Szamos river, 322
Szeged, 322
Székesfehérvár (Alba Realis), 322
Szent Endre, island, 317
Szigetköz, island, 317

TABANG, 567
Table Bay, 985; Mountain, 985
Tableland, definition, 49
Tablet-tea, 529
Tabriz (Tauris), 462
Tabu in Pacific Islands, 661
Tacana, Mount, 783; Volcano, 783
Tachin river, 508
Tacoma, 769
Taconic Mountains, 722
Tacora, Mountain, 841
Taff valley, 165
Tafilet, 905

Tagus river, 368, 369, 379, 380, 381
Tahiti, 656, 657
Tai-dong river, 543
Tai-o-hae, 658
Taimyr land, 1045; peninsula, 423
Taipa island, 538
Taiping rebels, 533
Taita mountains, 931
Taiwan island, 553
Taiyuen, 532
Tajik, people, 467
Tajumulco, Mount, 783
Tajura, Bay, 935
Takao, 554
Taklamakan, 431
Taku, 531
Talage people, 655
Talca, 848
Talcahuano, 848
Tali, 535
Talienwan (Dalni) 419, 539
Talus=Scree, 57
Taman, 394
Tamar, river, 162, 167; river, Tasmania, 611
Tamarida, 937
Tamatave, 1020
Tamboro mountain, 572
Tamega river, 381
Tamil, language, 479; people, 505
Tampico, 781
Tamsui, 554
Tamworth, N.S.W., 600
Tana river, 892, 931
Tanala people, 1017
Tanaland, 938
Tananarive, 1019
Tanaro valley, 355
Tancitaro, 775
Tandjong Priok, 563
Tanganyika, Lake, 931, 942, 947; fauna of, 93; discovery, 901
Tangarong, 568
Tangier, 905
Tanjore, 495
Tanna island, 647
Tantah, 927
Taoism, 528
Tapa-shan range, 524
Tapajoz, 873
Tapti river, 491; valley, 471, 492
Tapuae-nuku mountain, 628
Tarapacá, 846, 847
Tarasp, 263
Tarbagatai mountains, 396, 398
Tarento, 365
Tarhuna plateau, 916
Tariffs, 121
Tarija, 842
Tarim region, 433; river, 540
Tarma, 839
Tarnopol, 313
Tarnow, 313
Tarragona, 377
Tarsus, 443
Tartars, *see* Tatars
Tashkent, 409, 417
Tasman in New Zealand, 632; Range, 628
Tasmania, 576, 610–613; climate, 580; geology, 579; rivers, 578
Tasmanian devil, 612
Tatars, 130, 435; in Russia, 403
Tateyama mountain, 546
Tatra, 311
Tatta, 491
Taunus, 268, 287
Taupo Lake, 629, 630
Tauris, 462
Taurus, Mount, 439; range, 41
Tay Bridge, 158; Loch, 156; river, 156, 157
Taygetos, Mount, 345
Te Anau lake, 629
Tea, in China, 529; in Ceylon, 505; in India, 484; in Japan, 551; in Natal, 994
Teak, in India, 476; in Siam, 508, 510
Tebessa, 908
Tees, as boundary, 162
Tegernsee, lake, 272
Tegetthof Expedition, 1030
Tegucigalpa, 789
Tehama, 452
Tehran (Teheran), 462
Tehuacan, 778
Teima, oasis, 456
Teixeira, Pedro, Explorer, 871
Telegraph cables, 60
Tell in Algeria, 907; in Tunisia, 913
Telok-betong, 566
Telokh Berau, 642
Telugu language, 479
Teluk Anson, 514
Temperate Zone, definition, 78
Temperature, 74; of deep water, 66; of Ocean, 65; and Rainfall, 141; Zones of hydrosphere, 66
Tenasserim, 472, 496
Tenedos island, 444
Tenerife island, 952
Ténez, 911
Tengri-nor, lake, 541
Tennessee, caverns, 732; river, 728
Tenochtitlan, 781
Tenryu-gawa, river, 546
Tenterfield, 600
Teplitz, 307, 308
Tequixquiac, 777
Terceira island, 384
Terek river, 395; -davan pass, 540
Terekti pass, 540
Tergeste, 315
Ternate island, 570
Terra Australis, 584; roxa (Massapé) soil, 867
Terre Napoleon, 617
Terrigenous deposits, 64
Territories, of Canada, 700–704
Territory, leasing of, 120
Tertiary Formation, Geological position of, 51
Teslin lake, 703
Teton mountains, 760
Tetrahedral Theory of the Earth, 42
Tetuan, 905
Teutoburger Wald, 289
Teutonic language, 132; tribes, 144
Texas, 754; Acquisition of, 711; Coastal Plain, 754
Texcoco lake, 776
Thai Binh, 516; people, 518
Thales, 26
Thalweg = dale-way, 50; as boundary, 114
Thames, as boundary, 162; Estuary, 182, 183; river, 177, 182; river, Ont., 695
Than Hoa, 519
Thanet, Isle of, 181
Thasos, island, 343
Thebes, 348
Theiss, river, 317
Therezina, 874
Thessaly, 345–348
Thièle (Zihl) river, 258
Thingvallavatn, lake, 213
Thirlmere, 163
Thisted, 210
Thompson, David, Explorer, 699
Thomson, Joseph, Explorer, 902
Thomson, Prof. J. Arthur, on Distribution of Living Creatures, 83
Thoroddsen, Dr. Thorvald—Iceland, 212–215
Thórsá, river, 213
Thorshavn, 211
Thos, people, 518
Thousand Islands of Java, 563; Ontario, 693
Thrace, province, 332
Thracians, 334
Thraco-Macedonian Region, 332
Thun, 264
Thurgau canton, 263
Thurgovia (Thurgau), 263
Thuringia, 290
Thuringian Basin, 268
Thuringians, 276
Thursday Island, 592
Thurso, 155
Thyateira, 443
Tian Shan mountains, 396, 398
Tiahuanaco, 100
Tiaret, 912
Tiber river, 356
Tiberias, 450
Tibet, 540
Tibetan region, 433
Tibeto-Burman people, 480; -Chinese People, 105; -Indo-Chinese People, 105
Tiburon peninsula, 801
Ticino, Alps of, 258, 259; canton, 265; river, 363
Tidal Current, 65; Wave, 65
Tides, action of, 56; cause of, 24; nature of, 65
Tidikelt oasis, 906
Tidore islet, 570
Tientsin, 531, 532
Tierra Caliente in Andes, 825; in Central America, 786; in Mexico, 777
Tierra del Fuego, 814, 851; map of (unnamed), 843
Tierra Fria in Andes, 826; in Central America, 786; in Mexico, 777
Tierra Templada in Andes, 825; in Central America, 786; in Mexico, 777
Tieté river, 876
Tiflis, 416
Tiger, in India, 477; range of, 84
Tigris river, 440, 447
Tih desert, 449
Tihany, peninsula, 318
Tikhvin canal, 406
Tilburg, 222
Tilbury, 184
Timber in Argentina, 851; in Canada, 691, 694; in India, 476; in Sweden, 202; in Western Australia, 621
Timbo, 957
Timbuktu, 958

Time, 17; reckoning in North America, 678
Timne people, 962
Timor, 572; -laut islands, 573
Timsah, Lake, 928
Tin, in Banka, 566; in Malay Peninsula, 511; in Siam, 510; in Tasmania, 611
Tinne tribe, 684
Tipperary Co., 194
Tiquina, strait, 840
Tiracol, 502
Tirol, 304
Tisza (Theiss) river, 317
Titicaca, island, 840; **Lake**, 817, 835, 840
Tji-liwong, 563
Tjilatjap, 563
Tlemçen, 912
Toba lake, 564, 566
Tobacco in Cuba, 796; in Egypt, 922; in Sumatra, 566; in Transvaal, 1008; trade of Bristol, 166
Tobago island, 812
Tobol river, 398, 426
Tocantins river, 873, 874
Tödi mountains, 258
Togo, 972
Tokaido, 552
Tokushima, 553
Tokyo, 551, 552; temperature and rainfall of, 547
Toledo, 376; O., 743; O. site, 738
Tolima, 827; mountain, 825
Tolmezzo, 359
Toltecs, 779
Tomsk, 418
Tonegawa river, 547
Tonga, 653
Tongaland, 996
Tonga-tabu island, 653
Tongariro mountain, 628
Tongas in East Africa, 945
Tongking, 516
Tonlé Sap lake, 517
Tönsberg, 206
Toowoomba, 593
Topography = description of places, 2
Torbes river, 886
Tordesillas, Treaty of, 822
Tornadoes of the Mississippi Basin, 751
Toronto, 695
Torquay, 167
Torre de Cerredo, 371
Torrens, Lake, 615; river, 619
Torrid Zone, definition, 78
Tortola island, 807
Tortuga, 801; island, 802
Totonicapan, 786
Toucouleur people, 956
Toul, 250,
Toulon, 253
Toulouse, 252
Tourane (Turan), 520; bay, 517
Tourcoing, 249
Tours, 251
Towarah tribe, 926
Towik (Nejd), 456
Towns, origin of, 115; of India, 486; in Russia, 409
Township plan in Canada, map, 684
Townsville, 591, 592
Trade-wind Belts, climate of, 78
Tralles, 443
Trangsund, 412
Tranh-Ninh, 519
Trans, -Alai mountains, 396; -Caspian district, 396, 416; -Caspian Railway (map), 417; -Mississippi States, 750; -Saharan railway project, 958
Transbaikalia, 398, 419
Transcaspia, 388
Transcontinental Telegraph in S. Australia, 618
Transdnieperia, 388
Transmontano mountains, 380
Transitional Area, 46
Transport, Means of, 121
Transtagano, 380
Transylvania (Erdély), 318, 322
Transylvanian Alps, 327
Transvaal Colony, 1007–1011
Transverse Valley=defile, 50
Trapezus, 443
Trarza, people, 956
Travancore, 498
Trave river, 294
Traz-os-Montes, 380
Treaty-ports in China, 529
Trebbia, river, 356
Trebizond (Trapezus), 443
Tree-Kangaroo, 589
Trelleborg, 203
Trembling Mountain, 690
Trent, river, 170, 171
Trento, 306
Trenton, N.J., site, 720
Tres Sorores (Mont Perdu) mountains, 371
Trèves, 288
Triassic Formation, geological position of, 51
Tribal or Racial boundaries, 114
Trichinopoli, 495; temperature and rainfall of, 474
Trient (Trento), 306
Trier (Trèves), 288
Triest, 315; climate of, 298
Trikkala, 348
Trincomali, 506
Tring Kanu, State, 509
Trinidad, Cuba, 796, 798; Island, 811
Trinity bay, 705
Tripoli, 916, 917, 918
Tristan da Cunha, 1014
Triumfo, 788
Trois Frères island, 1023
Trolihätta Canal, 203
Trombetas river, 867, 873
Tromsö, 207
Trondhjem, 207
Troödos mountain, 445
Tropical plant division, 88
Troppau, 309
Troy, N.Y., 729, 736
Troyes, 249
Truk Islands, 655
Truxillo, 837
Tsana, Lake, 931, 934
Tsanpo, river, 541
Tsetse fly in British Central Africa, 949; in East Africa, 932; in German East Africa, 942
Tsiami tribe, 518
Tsientang-kiang, 535
Tsimshiian people, 684
Tsinan, 532
Tsinling-shan, mountains, 522; range, 524
Tsiribihina river, 1016
Tsitsihar, 539
Tua river, 381
Tual, rainfall, 785
Tuamotu islands, 657
Tuareg Berbers, 956; people, 898
Tuat oasis, 906
Tubuai islands, 656
Tucacas, 887
Tucuman, 855
Tugela river, 996
Tukang Bessi island, 569
Tula, 414, 779
Tulcan, 833
Tumbez river, 831
Tumen river, 543
Tunbridge Wells, 181
Tundra, 89, 402, 432, 1045
Tung-Kiang river, 535
Tungaragua province, 833; volcano, 830
Tungting lake, 524, 530, 533
Tunis, 915
Tunisia, 913–916
Tupi people, 822, 869
Turan, 425 (Annam) 517
Turanian steppes, 433
Turfan, 540
Turin, 362, 363; temperature and rainfall of, 359
Turkestan, 540; Russian, 395
Turkey in Europe, 340–344
Turki people, 105
Turkish Old Servia, 335
Turks, 334, 442; in Europe, 134; invasion of Europe, 10
Turks Islands, 805
Turquell river, 931
Turrialba, volcano, 784
Türst, K., maps of, 31
Turumiquire mountain, 887
Tuscany, 364
Tussac grass, 863
Tuticorin, 494
Tutuila island, 654
Tweed, river, 160, 169
Twelve Bens, 188
Twilight of high latitude, 75
Tyne, 169; as boundary, 162; ports, 151, 169, 170
Tyre, 450
Tyrrhenia, 353, 358
Tyrrhenian Sea, 353
Tyrrell, J. B.—Dominion of Canada, 679–704; Newfoundland, 704–707

UBANGI province, 978; river, 959, 975
Ucayali river, 816, 835
Udepur, 497
Ufa, 418
Uganda, 938
Ugi island, 648
Uifak, 1041
Uinta mountains, 761, 763
Ukamba, 938
Ukami, 941
Ulanga river, 942
Uliasutai, 539
Ullswater, 163
Ulm, 127, 284
Ulster, 193
Ulu-kem river, 400
Ulyungur river, 400
Um Delpha (Es Shayib) mountain, 929
Umanak fjord, 1041

Umbria, 364
Umbrian Appennines, 356
Umeå, 204
Umm Keis (Gadara), 450
Umniati river, 998
Umtali, 1002
Unare river, 885
Ungava, 700
Union island, 810
United Empire Loyalists, 694
United Kingdom, 138–196; coal of, 149; government of, 145; total trade of, 151; seaports of, 150; statistics of, 194, 195
United Provinces, 226
United States of America, 710–773; boundary, 113; coal production, 149; Pacific Islands, 651; and the Philippines, 558; physical divisions of (map), 719; total trade of, 151
Unstrutt, river, 290
Unterwald, Alps of, 258
Unterwalden, canton, 263
Unyamwezi plateau, 941
Unyoro, 938
Uomataka, 1012
Upernivik, 1043; glacier, 1042
Upland plain, definition, 49
Uplands, definition, 48
Upolu island, 654
Upper, Austria, 304; Greensand, geological position of, 51; Rhine Plain, 272; Tunguska or Angara river, 400, 426
Upsala, 204
Urabá (Darien), Gulf, 828
Ural mountains, 398, 414, 426
Ural-Altaic people, 105
Urfa (Edessa), 448
Urga, 539
Urgel, 377
Uri, canton, 263
Urmi, 463
Uruguay, 856–859, 871; river, 850, 857, 876
Urumchi, 540
Urúmiya (Urmi), 463
Urumtsi (Urumchi), 540
Urungu river, 400
Usambara Mountains, 941
Usbek, people, 467
Usedom, island, 270
Usk, river, 165
Uskub, 341, 343
Usoga, 938
Ussuri river, 400, 539
Ust Urt, 425
Usumacinta river, 776, 785
Utah, 765
Utica, N.Y., 736
Utila, island, 784
Utrecht, 219, 222
Uvea island, 645
Uxmal, 780

VAAL river, 1004, 1007
Vadsö, 207
Værö, 199
Vaga river, 399
Vaitaca people, 869
Valaam island, 393
Valais, canton, 265
Valdai hills, 389; plateau, 128
Valdeon, valley, 371
Valdivia, 848
Valdivia, Pedro de, 845
Valdivia, voyage of s.s., 1050
Vale of York, 170, 171
Valença do Minho, 383
Valencia, 377, 887; Lake, 887
Valentia, island, 194; temperature and rainfall, 141
Valera, 886
Valetta, 367
Valira river, 377
Valladolid, 374, 376
Valley, definition, 50
Valona, 344
Valparaiso, 847; site, map, 847; temperature and rainfall, 819
Van (Dhuspas), 444; district, 440
Van Rees mountains, 642; Diemen Gulf, 614; Diemen's Land, 612
Vancouver, B.C., 116, 700; island, 697, 699
Vanikoro island, 647
Vanua Levu island, 652
Varanger fjord, 207
Vardar river, 332
Vardö, 207
Varna, 339
Varthema, 565
Vasco da Gama, 10
Vasconcellos, Capt. Ernesto de—Portugal, 379; Macao, 538; Portuguese East Africa, 944; Portuguese India, 502; Portuguese Timor, 573; Portuguese West Africa, 979
Vassili Ostrov, island, 410
Vatican, The, 364
Vatnajökull, 212
Vatomandry, 1020
Vatwa race, 945
Vaud, canton, 264
Vedda people, 505
Vega, 377
Vega Real, 801
Vegetation map of Africa, 895
Veile, 210
Veldt, 986, 1007
Velikaya, river, 391, 393
Vener, Lake, 200
Venersborg, 205
Venetia, 363
Venezia (Venice), 363
Venezuela, 884–888
Venezuelan Coast Ranges, 885; Guiana, 884; Range, 818
Venice, 361, 363
Ventuari river, 884
Venus, Point, 657
Vera Cruz, 781
Veragua mountains, 824
Verano, Central America, 785; Colombia, 826
Verde, Cape, 954
Verdun, 250
Vereczke Pass, 316
Verkhoyansk, 420; climate of, 200; rain and temp. curves for, 401; -Stanovoi heights, 426
Vermandois, 249
Vermont, 724
Versailles, 250
Vertical, Circles, definition, 15; Relief, Climatic Influence of, 79
Vestenfjeldske district, 206
Vesteraalen islands, 199
Vestfjord, 199
Vesuvius, Mount, 365
Vetter, Lake, 200
Vevey, 264
Viborg, 412
Vichy, 252
Vicksburg, Miss., 750
Victoria, 602–610; B.C., 700; (Hongkong), 537; Kamerun, 974; Rhodesia, 1002; Falls, 999; Lake, Pamirs, 465; Land, Antarctic, 1049; Mount, New Guinea, 635; Mountains, 603; Nyanza, 930, 931; Nyanza, discovery, 901; Peak, Hongkong, 537; river, S.A., 614
Vicuñas in Peru, 837
Vidago, 382
Vidin, 339
Vienna (Wien), 309, 311; Climate of, 298; Congress of, 136
Vienne, 253
Vieques island, 800
Vigo, 376
Vilcamayu, vale, 839
Vilcañoto, knot of, 835
Villa, Boa, 874; Clara, 797; Concepcion, 862; del Pilar, 862; Nova de Gaia, 381; Real de Santo Antonio, 381; Rica, 862, 875; Velha de Rodam, 381
Villages in India, 483
Vilna, 406, 409, 411
Vilyui, river, 400
Vincennes, 250
Vincent Pinçon river, 883
Vinchiaturo Pass, 356
Vindhya, hills, 471, 473
Vindobona (Vienna), 311
Vindouissa, 264
Vine, in France, 243; map, 244
Vinh, 519
Virgin, Gorda, 807: Islands, 805, 807
Virginia, boundary, 718; City, 767; mountains in, 727
Visby, 205
Vistula (Weichsel) river, 270, 294, 299, 391, 412
Vitebsk, 391, 409
Vitegra, river, 393
Viti Levu island, 652
Vitim plateau, 400
Vitoria, 376
Vitosh mountains, 331, 339
Vivi, 978
Vizella, 382
Vladivostok, 409, 419
Vogelsberg, 288
Voiron, 245
Volcanic, Action in East Africa, 931; Islands, definition, 62; necks as Town sites, 53; rocks, 52
Volcanoes, of Java, map, 561; of Mexico, 775; Extinct, of Victoria, map, 603
Volga, river, 390, 414
Volgo, Lake, 390
Volkhov, river, 393
Volo, 348
Volta, river, 892, 963
Volturno, Monte, 358
Volturno, river, 356
Voralpen, 126
Vorarlberg, 304
Vörösvágas, 318
Vosges mountains, 237
Vuelta Abajo, 796, 797; **Arriba**, 797
Vuoxen, river, 392
Vychegda river, 399
Vyrnwy river and lake, 165
Vyshnii-Volochek Canal, 406

WAAL, river, 218
Wad, Draa, 904; Gheris river, 906; Ghir river, 906; Messaoud, 906; Ziz river, 906
Wadelai, 921
Wadi, Arabah, 919, 929; Feiran, 923; Halfa, 927; Hams, 454; Kina, 929; Refah, 918
Wagadugu, 958
Waganda, people, 933
Wagga-Wagga, 600
Wagner, Prof. H., hypsographic curve, 46, 47
Wahsatch mountains, 760, 761
Waikato, river, 630
Waikolo, lake, 571
Waini river, 879
Wairarapa, 630
Waitemata, 627
Wakamba people, 933
Wakatipu Lake, 629
Wakefield, Edward Gibbon and New Zealand, 632
Wakhi-jui, 465
Walachia, 327, 329
Waldeck, Principality, 289
Waldenburger hills, 292
Waldseemüller, 11, 35
Wales, 163–165; derivation of, 162; rainfall of, 142
Walfish Bay, 985, 1012
Wallace, Dr. A. Russell, 12, 87; Island Life, 86
Wallace's Line, 422; map, 555
Wallaroo, 619
Walloon, people, 225
Wami river, 941
Wanganiu river, 630
Wanyika people, 933
Wardhouse (Vardö), 207
Warnemünde, 210
Warrnambool, 579, 609
Warsaw (Warszawa), 406, 409, 412
Warwick, Queensland, 593
Warwickshire, 174
Wash, The, 179
Washburn, Mount, 763
Washington, D.C., 731; D.C., longitude of, 31; D.C., site, 720; Mount, 717; State, 764
Wastwater, 163
Wataita people, 933
Watana, 508
Water-parting, definition, 50
Water-partings of Brazil, 866
Water Power in New England, 725; of Ohio region, 740
Waterbury, U.S., 726
Waterfall, 56
Waterford, 194
Wateringues, 249
Waterloo, field of, 227
Watershed, definition, 50
Watersheds, changes in, 55
Waterways in China, 530; of France, 245
Watling Island, 803; Street, 183
Watten, shallow flats, 270
Waves in Ocean, 67
Waziri, people, 467
Weald, The, 180
Wealden, Geological position of, 51
Wear river, 170
Weaver river, 174
Webi Shebeyli river, 931, 936
Wed-el-Kebir, 908
Weddell, Capt. J., Antarctic explorer, 1048
Wei river, 523, 532
Weichsel (Vistula) river, 270
Weihaiwei, 533
Weimar, Grand duchy, 290
Weisshorn, mountain, 258
Welle province, 978
Wellesley Islands, 587
Wellington, Mount, 613; N.Z., 634
Welsh language, 145, 163
Wemberre rift, 941
Wenchou, 535
Wend people, 275
Wenham ice, 725
Wenlock Edge, 164
Wentworth, N.S.W., 600
Wepener, 1004
Werra valley, 290
Weser river, 270; Uplands, 289
Wessex, name, 144
West, Africa, 952–959; end of a town, 141; Ham, 184; Indian Colonies, 803–812; Indies, 667, 791–812; Indies, discovery of, 10; Indies, map, 791; Indies, Sugar-cane Industry of, 117; Prussia Province, 293; Riding Coal-field, 170; Virginia, 733
Western, Alps, 126; Cordillera of Andes, 816; Australia, 620–626; Dvina river, 391; Ghats, climate, 475; Port, 602, 605
Westerwald, 287
Westminster, 183
Westphalia, 288, 289, 294
Wetta island, 573
Wetterhorn, mountain, 258
Wexford, 193
Wexiö, 204
Wey, river, 180
Weyprecht, Lieutenant, Arctic voyage, 1029, 1030
Whales in Antarctic, 1051; in Arctic, 1039
Wharfe valley, 168
Wharton Range, 635
Wheat in Egypt, 922; in France, 243; in India, 484; in Manitoba, 696; in United Kingdom, 148; in United States, 715; in Washington State, 764
Whitby, 177
Whitney, Mount, 767
Whitsunday Passage, 588
White, Fish in Canada, 696; Island, 628; Mountains, N.H., 670, 716, 717; Nile, 920; races, in Tropical Countries, 110; Russia, 411; Russians, 404; Sea, 407
Whittle, Cape, 689
Whyda, 957
Wiche (King Karl's) Land, 1044
Wick, 155
Wide Bay district, 592
Wieliczka, 312
Wien (Vienna), 311
Wiener Wald, 310
Wiener's Diagram of Solar Heat, 72
Wiesbaden, 288
Wiide Bay, 1044
Wilcannia, 600
Wilhelm, Mount, 639
Wilhelmshaven, 294
Wilkes, Lieut., in Antarctic, 1048
Willemstadt, 806
Williamstown, 608
Willoughby, Arctic voyage, 1025
Wilmington, N.C., site, 720
Wilson, Sir Charles W.—Arabia, 451; Asiatic Turkey and Arabia, 439; Mesopotamia, 447; Syria, 448
Wilson Promontory, 602, 604
Wimmera District, 603, 609
Winchelsea, 181
Winchester, 179
Wind, 75, 76; and Water, 67, 68
Windermere, 163
Windhoek, 1013
Windmill Hills, 613
Windsor, 182
Winds, Normal system of, 71
Windward, Passage, 801; Islands, 809
Wine in Algeria, 909; in Cape Colony, 987; in France, 243; in Italy, 362; in Peru, 836
Winnipeg, 696; Lake, 696; river, 696; Temperature and rainfall, 675
Winnipegosis, Lake, 696
Winterthur, 263
Winton, 591
Wisconsin - Michigan Uplands, 734
Wishaw, 159
Witham river, 178
Witkowitz, 309
Witwatersrand, 1009
Wodonga, 609
Wollin, island, 270
Wolof people, 956, 961
Wolverhampton, 176
Woods and Forests, 89
Wool in Cape Colony, 987; in N.S.W., 596; in Victoria, 603
Woolwich, 184
Worcester, 166; county, 174; Mass., 726
Woshin district, 456
Wrangell Land, 1031
Wuchang, 534
Wuchou, 530, 535
Wuhu, 533
Wupper river, 288
Wurno, 972
Württemberg, Kingdom, 285
Wurzburg, 285
Wusung, 531; river, 533
Wyoming, 757, 760, 762
Wytfliet, 584
Wyville Thomson ridge, 1034

XANTHOCHROI, 107
Xerophytes, 89

YABLONOVYI Khrebet, 398
Yachou, 534
Yaila Tagh, 394
Yak in Tibet, 541
Yakoba, 972
Yakutsk, climate of, 402
Yale mountain, 760
Yalu river, 543
Yambo, 454
Yamdena island, 573
Yamdok-tso lake, 541
Yana river, 426
Yanaon, 503
Yangtse river (Yangtse-kiang), 522, 526, 530, 533, 534, 541

Yao people, 949
Yap island, 655
Yaracui, 887
Yari-qa-take mountain, 546
Yarkand, 540; oasis, 540
Yarmouth, 182
Yarra Yarra river, 603, 608
Yarrawonga, 609
Yatong, 541
Yatung, 541
Yaunde, 974
Yautepec, 778
Yeа, 838
Yedo, 552
Yefren, 916
Yekaterinoslav, 415
Yeketerinburg, 414
Yellow Sea, 424; River (Hwang-ho), 424
Yellowstone canyon, 763; lake, 763; Park, 763; river, 756
Yemama, district, 456
Yemen, 453, 454
Yenisei, river, 398, 399, 400, 423, 426
Yeniseisk, 418
Yeou river, 970
Yerba-maté in Argentina, 851; in Brazil, 876; in Paraguay, 861
Yes Tor, 166
Yeshil Irmak (Iris) river, 439, 440
Yezd, 463
Yezides, 447
Yezo island, 546, 547
Yo Semite Valley, 767
Yobe river, 970
Yochou, 534
Yodogawa, river, 552
Yokohama, 553
Yola, 972
York, Cape, 587; Peninsula, 616; town of, 171; W.A., 626
Yorkshire, 168; Coal-field, The, 150; Moors, 177; Plain, 171; Wolds, 178
Yoruba (Ilorin), 967, 968, 971; people, 971; -Jekri people, 967
Yser, river, 225
Yu-men or Jade Gate, 523
Yucatan, 774, 778
Yuccas, 766
Yug river, 399
Yukon, delta, 667; District, 702, 703; river, 681, 698, 770
Yule, Mount, 635
Yunque, 798
Yuruari territory, 884
Yungus, definition, 842
Yunnan, 524, 525, 534
Yzabal (Golfo Dulce) Lake, 785

ZAB river, 440
Zacatecas, 780
Zagazig, 922
Zaghwan, 915; Mount, 914
Zagreb (Agram), 321, 323
Zagros chain, 458
Zaila, 936
Zaire (Congo) river, 975
Zaisan Lake, 400
Zambezi, basin, 892; name, 947; river, 944, 946, 982, 998, 999
Zambezia, 945
Zamboango, 559
Zambos in Central America, 787
Zamora river, 830
Zante island, 349
Zanzibar, island, 939; map, 939; temperature and rainfall, 893
Zaparo people, 832
Zapata Cienaga, 794
Zara, 315
Zarafshan (Zerafshan), 540; river, 397
Zaragoza, 377
Zaria, 972
Zaruma, 833; basin, 831
Zealand, Denmark, 210; Netherlands, 222
Zebu, 558, 559
Zeehan, Mount, 611
Zella, 916
Zemio, 959
Zenith, definition, 15; Distance, definition, 15
Zermatt, 258, 265
Zeta river, 337
Zezere river, 381
Zihl river, 258
Zillerthal, 306
Zimmermann, M.—French India, 503; French Indo-China, 515; French West Africa, 953; French West Indies, 808; Réunion, 1024; St. Pierre and Miquelon, 707
Zirknitz, lake, 303
Zlatoust, 418
Zollverein, 23, 118
Zomba, 950
Zones of Climate, 78; of human culture, 98; of Uncertain Rainfall in India, 476
Zoo-Geographical Regions, 87
Zorn, Valley, 287
Zuara, 917
Zuchiate River, 774
Zug, canton, 264
Zugspitze, 267
Zulfikar, 465
Zulia, 886
Zulu language, 1003; people, 990
Zululand, 996
Zulus in Rhodesia, 1001; in Natal, 995
Zumpango, Lake, 777
Zungeru, 972
Zurich, canton, 263; lake, 258
Zwickau, 291
Zwolle, 222
Zyrian people, 403

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